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PORT PHILLIP SURVEY 1957-1963

Victoria, Australia

Part 2

From 1957-1963 the National Museum of Victoria, with the co-operation of the Fisheries and Wildlife Department, conducted a systematic study of Port Phillip Bay, Victoria. In 1966 Memoir 27 was published, containing an account of the physical environment and some of the biology. This Memoir completes the publication of the results of the Survey, except for some individual papers that may follow.

Mrs J. Hope Black (née Macpherson) organized these contributions and integrated the material.

For the purposes of this Survey, Port Phillip was divided into a grid system of numbered Areas. Charts 1 and 2 show these Areas, and the numbered localities therein. In this Memoir, the papers record localities by the Area number followed by the Station number in brackets, e.g. Area 20 (124). If a number follows the brackets, it represents the number of specimens collected there of the taxon under discussion.

In the text, 'Survey' means the Port Phillip Survey 1957-1963, 'Fig.' means text-figure, and 'fig.' means plate-figure.

1

MEDUSAE COELENTERATA

By R. V. Southcott

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Abstract

A small collection of medusae was submitted from the Survey. This contained three species of Scyphomedusae, namely *Cyanea capiliata* (Linné, 1758), *Catostylus mosaicus* (Quoy and Gaimard, 1824) and *Pseudorhiza haeckeli* Haacke, 1884, and one species of Hydromedusae, *Bougainvillia ramosa* (Beneden, 1844). The last two species have not previously been recorded from Port Phillip Bay.

Introduction

A small collection of medusae submitted from the Survey comprised only four species, all previously known from the Indo-Pacific area, three being Scyphomedusae and one belonging to the Hydromedusae. A small amount of additional material of two species, *Catostylus mosaicus* (Quoy and Gaimard, 1824) and *Cyanea capillata* (Linné, 1758), from Port Phillip Bay has been included in this report; both were collected for other purposes during the period of the survey. Reference to the specimens of the latter species has been made by Kramp (1965: 260-1). The other two species are *Pseudorhiza haeckeli* Haacke, 1884, and *Bougainvillia ramosa* (Beneden, 1844), which have not previously been reported from Port Phillip Bay. All specimens examined by the author are given a serial number, prefixed by A, as a means of ready reference to notes made at the time of examination. These numbers have been placed immediately after the station numbers in the list of material. They are also used to identify individual specimens in the text.

Diameters are measured to the lappet edges (unless otherwise specified), the specimen being gently compressed by a piece of clear plastic enough to enable measurement. As specimens in preservative are not always perfectly circular, all larger specimens are measured in more than one diameter and the figures averaged.

Order Semaeostomeae L. Agassiz, 1862

Family Cyaneidae L. Agassiz, 1862

Cyanea Péron and Leseur, 1809

Cyanea capillata (Linné, 1758)

Pl. 1, figs. 1-4; Pl. 2, figs. 1-4.

Synonymy (part).

Cyanae annaskala Lendenfeld, 1882a: 465.
Cyanea capillata Stiasny and Maaden, 1943: 242, 244, 250. Cleland and Southcott, 1965: 149, 152.

Kramp 1961: 332-3; 1965: 260. For further synonymy see Kramp 1961, 1965 as quoted.)

Material: Survey Area 20 (124), A 705 A, B. 2 specimens A. disc diam. 117 mm; B. disc diam. 116 mm; A 1131 1 juvenile specimen disc diam. 30 mm. Area 55 (intertidal Mornington 9 June 1963) 1 specimen disc diam. 77 mm, R. Southcott Coll.; Area 7 (Elwood Beach, coll. S. Wiener, 2 Jan. 1961) A 457 (3 specimens). The Elwood Beach material was studied by Kramp 1965: 260-1, who recorded the specimens with a disc diam. of 37 and 85 cm respectively. Dr Wiener recorded (pers. comm.) that these jellyfish had been plentiful at Elwood Beach during the summer of 1960-61, adding 'The tentacles of some specimens were 3-4 feet (1-1·3 m) long. Many jellyfish had no or very short tentacles . . . the tentacles caused pain, itchiness and erythema lasting for a few hours. [The medusae] are purple but the colour soon fades when they are removed from the sea".

This species has been listed a number of times for circum-Australian waters (Kramp 1965: 260-1; Mitchell 1962; Cleland and Southcott 1965) The first certain reference appears to be Lendenfeld (1882a: 465), who recorded it as a new species, *Cyanea annaskala,* from Port Phillip Bay. The species may be sufficiently numerous in the waters of Port Phillip Bay to be a nuisance to swimmers, causing skin and eye lesions (Mitchell 1962; Wiener 1961).

Classification and Morphology

The taxonomic revision of Stiasny and Maaden (1943) was accepted by Kramp (1965: 260), and all the specimens of *Cyanea* from S. Australia and Victoria forwarded to him by the present author were placed in *Cyanea capillata.* From this Kramp (1965 was able to say 'We can safely state that *C. annaskala* von Lendenfeld [1882] and *C. muellerianthe* Haacke [1887] are synonyms of *C. capillata*'. All specimens referred to in the present paper also answer to *C. capillata* by the criteria of these authors. As described by Stiasny and Maaden (1943), the rhopalar and tentacle pockets are separated by continuous septa, these being free from cross-connecting perforations (Pl. 1, figs. 3-4).

In the subumbrellar system it has not been possible to identify the projecting spaces into the mesogloeal cores as finger-like or tree-like, nor can evidence of communication be seen. Possibly the specimens studied are too young and small to show these features, as all specimens are considerably smaller than the largest mentioned by these authors; Kramp (1961: 332) refers to specimens up to 1,000 mm in diameter.

Among the *capillata*-group there are three species recognized by Stiasny and Maaden (1943), the principal morphological differences cited being as follows:

1. Many anastomoses present between the ramifications of the stomach-pockets in the edge-lobes.

   C. purpurea Kishinouye, 1910.

   Few or no anastomoses between the ramifications of the stomach-pockets in the edge-lobes . . . 2

2. Proportion of the breadth of the concentric muscle band: interval between stomach edge and periphery 1: 3-3·5. Peripheral canals more or less curved.

   C. capillata (Linnaeus, 1758).

   Proportion of the breadth of the concentric muscle band: interval between stomach edge and periphery 1: 1-1·75. Peripheral canals straight.

   C. ferruginea Eschscholtz, 1829.

Unfortunately, in examining specimens by the criteria separating *C. capillata* and *C. ferruginea*, it is not difficult to convince oneself, with minor use of the imagination, that the peripheral canals are 'more or less curved' or 'straight', the differences being qualitative rather than quantitative. Another difficulty lies in the size criteria given by these authors (not shown in above morphological key) that *C. ferruginea* grows to 400 mm wide while *C. capillata* grows to 1,000 mm wide (l.c. 242). This is of little use in dealing with specimens of a series with widths ranging from 30-120 mm. The colour characteristics given of white, brown, blue, yellow, etc., for *C. capillata* and brownish or yellowish for *C. ferruginea* are also of little or no taxonomic value. Unfortunately, also the proportions given in the table of 1: 3-3·5 as against 1: 1·75 (Stiasny and Maaden 1943: 242) is possibly a misprint for the latter, since it is also given (p. 248) as 1: 3·75. There thus appears little justification for continuing to separate *C. capillata* and *C. ferruginea.*

As is common with *Cyanea*, there is considerable loss of tentacles from trauma or abrasion in many of the specimens. The tentacles of jellyfish frequently undergo considerable contraction with preservation, particularly when formol is used, and microscopic examination shows that some of these apparently mutilated tentacles are in fact complete.

Plate 1 shows two specimens of *C. capillata.* In fig. 1, specimen A705B shows branches of tentacles attached to their V-shaped adradial origin on the subumbrella. In fig. 2, specimen A706, the V-structures are more clearly visible. Figs. 3-4 illustrate the structure of the bell-edge.

Fig 3 is an area centred on a rhopalium, seen from the subumbrellar aspect, by transmitted light. Alongside the rhopalium are the rhopalar lappets; the one on the left is fully expanded, and extending into it are the ramifications of the body cavity, which are non-anastomosing. These extend from the rhopalar pouch, shown in part in the V-shaped central grey area. Outlining the sides of the V are portions of the radial subumbrellar musculature. On the outer side of each rhopalar lappet a light line can be seen running down through the photograph. These indicate the septa between the rhopalar and the tentacular pouches (pockets) which traverse the area of the circular muscle tissue, near the bottom of the photograph. These septa are not perforated in this species. The tentacle origins outline an adradial V-shaped area, one on each side of the photograph, the inmost part beng the lower part or angle of the V, which points centrally. These lie below the tentacular pouches, which send their ramifications into the tentacular lappets at the edge of the bell.

Fig. 4 shows further detail of the rhopalium, septa and lappets. Some of the hollow tentacles, broken off short, are seen at the lower right-hand part of the photograph. Plate 2, fig. 1, shows the nematocyst-warts on the tentacle at a point away from the tip. In fig. 2 the nematocyst-warts extend to the tip of the tentacle, indicating that its functional efficiency is as good at the tip as elsewhere. In figs. 3 and 4 the nematocyst-warts are seen in greater magnification.

Occurrence

Records of this species are infrequent and this fact suggests that normally it does not penetrate inshore and into harbours during the summer (swimming) season when its occurrence would be noted. However, it was numerous enough in Port Phillip Bay in the summer of 1960-61 for its medical effects to be observed and discussed by Mitchell (1962) and Wiener (in Kramp 1965, and as quoted above). Mitchell (1962) stated that since 1882 (when Lendenfeld recorded a medusa in Port Phillip Bay as *Cyanea annaskala)* 'the jellyfish have not been seen in significant numbers, nor apparently have they been a medical problem before in this area' and decided that 'Unusual geographical events caused the jellyfish to infest the popular swimming beaches around Port Phillip Bay . . . in the summer of 1960-61', claiming that 'Normally it inhabits a warm current situated one mile away from the coast of Australia. However, late in 1960 westerly directed winds blew the organism into Port Phillip Bay on the south coast . . .'. The source of this information was not stated. Unusual biological events could be of equal importance. *Cyanea capillata* is world-wide, and too little is known about factors influencing its distribution for dogmatic statements to be made. It occurs below as well as at the surface, and is found in cold as well as warm waters. There appears to be little or no information on its ecological preferences and movements.

Order RHIZOSTOMEAE
Family LYCHNORHIZIDAE

Genus **Pseudorhiza** Lendenfeld, 1882
Pseudorhiza haeckeli Haacke, 1884
Pl. 3, figs. 1-4; Pl. 4, figs. 1-4; Pl. 5, figs. 1-3.

For synonymy see Kramp (1965, p. 269). Additional reference: Cleland and Southcott (1965: 95, 159).

MATERIAL: Port Phillip Survey: Area 20 (124). A 703. A. B. 2 specimens, immature; Area 5 (off Altona near Explosive Buoy, 28 March 1963). A 704 A-19 specimens. The following table lists the width of the disc against the length of the large appendage of the mouth-arms:

Specimen	Disc width (mm)	Appendage length (mm)
A703A	80	20 +
A703B	50	59
A704A (Pl. 4, figs. 1-4)	106	39 (?+)
A704B (Pl. 5, figs. 2-4)	72	76
A704C (Pl. 6, figs. 1-3)	32	26
A704D (Pl. 5, fig. 1)	95	—
A704E	87	—
A704F	82	68
A704G	66	76
A704H	46	30
A704I	53	41

As the above table indicates, in two specimens the appendage was missing, and in two others it appeared to be damaged. As Kramp (1965: 270) remarked, this appendage 'is present even in young specimens and nearly always retained

after preservation'. He recorded it missing from three specimens out of the 18 forwarded to him by the present writer from S. Australia and the N. Territory. In the present series the appendage was missing from two specimens out of a series of 11, but appeared to have been damaged in a further two specimens. The appendage may be longer or shorter than the disc width, as Kramp (*l.c.*) stated, and the above figures show. It originates not at the edge of the mouth-arm mass, but at the primary division of the mouth-arm, as was indicated by Haacke (1887).

Remarks: Lendenfeld (1882b) recorded a new genus and species of rhizostome medusa as *Pseudorhiza aurosa* Lendenfeld, 1882, from Port Phillip Bay and near Adelaide (Lendenfeld 1884, 1887). On geographical grounds, it would appear probable that this is the same as Haacke's species. However, Stiasny (1931) examined Lendenfeld's type but was unable to solve this question, owing to the poor condition of the specimen. Kramp remarked (1965, p. 269) that the 'description is insufficient and the figure probably misleading'. In view of this Kramp (*l.c.*) retained the name *P. haeckeli* (Haacke), as have other authors.

Pseudorhiza haeckeli is confined to Australian waters where it is one of the largest and most common medusae being cast up whole or fragmented on sandy beaches, e.g. in the Adelaide region. It has been recorded from S. and S.W. Australian waters, and there is an isolated record from Arnhem Land (Kramp 1965). Despite its frequency, there does not appear to be a common name that has achieved currency. Specimens may easily be recognized by the reddish or brownish network seen in the disc of all but the smallest specimens. From the dorsal aspect the gastral filaments outline a cross, similar to that seen in *Catostylus mosaicus*. Specimens illustrated in Plate 3, fig. 3, Plate 4, figs. 1-3, and also the juvenile specimen (A704C) in Plate 5, fig. 1, show this cross clearly.

In the canal system, eight radial canals reach the bell margin (Pl. 4, figs. 1-4 and Pl. 5, fig. 1), while a further eight reach only the ring canal (Pl. 4, fig. 4, and Pl. 5, fig. 2). In each of the 16 spaces thus formed there are (usually) 8-10 centripetal unbranched blind vessels. These characteristics are part of the generic definition (Kramp 1961: 367). In each octant are six velar lappets. Eight rhopalia are present. The mouth-arms extend out about as far as the edge of the disc, as can be seen in Plate 3, figs. 1-4, Plate 4, fig. 4, and Plate 5, figs. 2-3. The nematocyst-warts are spread more or less evenly over the exumbrella, without any evidence of a circular arrangement. They are present even in young specimens, as previous authors have remarked, and are figured in Plate 5, figs. 1, 3, and less clearly for a larger specimen in Plate 4, figs. 1, 3. The appendage to the mouth-arms is three-cornered in section.

Family Catostylidae

Genus **Catostylus** L. Agassiz, 1862

Catostylus mosaicus (Quoy and Gaimard, 1824)

Pl. 5, figs. 4-5

For synonymy see Kramp (1961: 370) (1965: 271), and in addition Cleland and Southcott (1965: 29, 91, 97, 152, 157, 160-1, 164).

Material: Port Phillip Survey: Area 13 (82) A 702. 1 specimen, disc diam. 130 mm. Area 20 (124) A1130 1 specimen immature, diam. 40 mm to disc turnover. S.A. Museum Coll.: Area 13 (Sandringham 20 Mar. 1960, coll. J. H. Barnes) A 439 2 specimens diam. of one specimen 180 mm to disc turnover (other specimen not accessible).

Dr J. H. Barnes, to whom the author is indebted, supplied the following field notes: 'Light overcast day, no wind, 5 p.m., tide falling. Thousands seen in deep water in shelter of breakwater, lesser numbers in broken water to seaward. They seem to avoid water shallower than 4 feet (1·3 m) . . .'.

An immature specimen A1130 is illustrated in Plate 5, figs. 4-5. This shows the external characters of the species. The mouth-arms project beyond the bell-edge, being thus in compressed material visible from above as well as below. The distal part of the mouth-arms are tapering, three-winged, blunted, without appendages.

Remarks: This common Australian medusa is recorded for the E. coastline of Australia, from Port Phillip Bay to N. Queensland and to

the S. coast of New Guinea. It appears to be an Australian species, apart from one doubtful Philippines record (Kramp 1965: 272). It is an estuarine form, being well-known in the harbours of Melbourne, Sydney, and Brisbane, as well as further north.

Order ANTHOMEDUSAE
Family BOUGAINVILLIIDAE
Genus **Bougainvillia** Lesson, 1836
Bougainvillia ramosa (Beneden, 1844)
Pl. 6, figs. 1-4

For synonymy and definition see Russell 1953: 153-4; Kramp 1961: 81-2; Kramp 1968: 31, 34.

MATERIAL: National Museum of Victoria. Area 13 (Sandringham, coll. P. M. Hoggart, 29 Oct. 1963) 20 specimens Bell height 1·0-2·0 mm, bell width 1·0-1·7 mm.

REMARKS: The specimens correspond in Kramp's (1968: 31) key for the Hydromedusae of the Pacific and Indian Oceans. A weak peduncle is present, and the oral tentacles are branched dichotomously once. These are comparatively small specimens, as according to Russell (1953: 155) and Kramp (1968: 34) mature specimens may be 3·5 or 4 mm in bell height. This species has been widely recorded from the Atlantic and Pacific Oceans, either as the hydroid or medusa or both. This is the first record for Port Phillip Bay.

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References

AGASSIZ, L., 1862. *Contributions to the Natural History of the United States,* Vol. 4. Boston.

BENEDEN, P. J. van, 1844. Recherches sur l'embryogénie des tubulaires, et l'histoire naturelle des différents genres de cette famille qui habitent la côte d'Ostende. *Mém. Acad. R. Belg.* 17: 1-72 (teste Russell, 1953: 153, 509).

CLELAND, J. B., and SOUTHCOTT, R. V., 1965. Injuries to man from marine invertebrates in the Australian region. National Health and Medical Research Council. Commonwealth Dept. of Health, Canberra, Spec. Rept. Ser. No. 12.

CUVIER, C., 1799. *Journal de Phys.* 49: 436 (teste Mayer 1910: 631).

ESCHSCHOLTZ, F., 1829. System der Acalephen. Eine ausführliche Beschreibung aller medusenartigen Strahltier, 1-190 (Berlin) (teste Kramp 1961 and other authors).

HAACKE, W., 1884. *Pseudorhiza haeckelii,* sp. n., der Endspross des Discomedusenstammes. *Biol. Zblt.* 4: 291-4.

————, 1887. Die Scyphomedusen des St. Vincent Golfes. *Jena Zeitschr. Naturwiss.* 20: 588-638.

KISHINOUYE, K., 1910. Some medusae of Japanese waters. *J. Coll. Sci. Tokyo.* 27 (9): 1-35.

KRAMP, P. L., 1961. Synopsis of the Medusae of the world. *J. mar. biol. Ass. U.K.* 40: 1-469.

————, 1965. Some medusae (mainly Scyphomedusae) from Australian coastal waters. *Trans. R. Soc. S. Aust.* 89: 257-78.

————, 1968. The Hydromedusae of the Pacific and Indian Oceans. Sections 2-3. *Dana-Report* 72: 1-200.

LENDENFELD, R. von, 1882a. Über Coelenteraten der Südsee. I. *Cyanea annaskala,* sp. n. *Z. wiss. Zool.* 37: 465-552.

————, 1882b. Über eine Übergangsform zwischen Semostomen und Rhizostomen (*Pseudorhiza aurosa,* g. et. sp. n.) *Zool. Anz.* 5: 380-3 (teste Kramp 1965; 269).

————, 1884. The Scyphomedusae of the southern hemisphere. *Proc. Linn. Soc. N.S.W.* 9(1): 155-69; 9(2) 242-9, 259-306.

————, 1887. *Descriptive catalogue of the medusae of the Australian seas.* Australian Museum, Sydney.

LESSON, R. P., 1836. Mémoire sur la famille de Beroides. *Ann. Sci. nat. (zool.)* (2) 5: 235-66 (teste Kramp 1961: 413).

LINNE, C. v. 1758. *Systema naturae,* 10th Ed. Stockholm.

MAYER, A. G., 1910. *Medusae of the World,* Vols. 1-3. Publ. Carneg. Instn. 109.

MITCHELL, J. H., 1962. Eye injuries due to jellyfish (*Cyanea annaskala*). *Med. J. Aust.* 2: 303-5.

MUSGRAVE, A., 1932. Bibliography of Australian entomology 1775-1930, with bibliographical notes on authors and collectors. *R. zool. Soc. N.S.W.,* viii + 380.

PÉRON, F., and LESUEUR, C. A., 1809. Histoire générale et particulière de tous les animaux qui composent la famille des Méduses. *Annls Mus. Hist. nat.* 14: 312-66, teste Kramp 1961: 304, 331, 421.

QUOY, J. R. C., and GAIMARD, J. P., 1824 Voyage autour du monde . . . exécuté sur . . . *l'Uranie et la Physicienne,* pendant . . . 1817-20. Publié . . . par M. Louis de Freycinet. Zoologie, iv + 712 (teste Musgrave 1932, 262; Kramp 1961: 423).

RUSSELL, F. S., 1953. *The Medusae of the British Isles.* Cambridge U.P.

STIASNY, G., 1931. Die Rhizostomeen-Sammlung des British Museum (Natural History) in London. *Zool. Meded.* 14: 137-78 (teste Kramp 1965: 269, 278).

STIASNY, G., and MAADEN, H. van der., 1943. Über Scyphomedusen aus dem Ochotskischen und Kamtschatka Meer nebst einer Kritik der Genera *Cyanea* und *Desmonema*. *Zool. JB.*, Abt. Syst. 76(3): 227-66.

WIENER, S., 1961. Personal communication, and in Kramp 1965: 261.

Explanation of Plates

PLATE 1

Fig. 1—*Cyanea capillata* L., A705B, disc diam. 116 mm subumbrellar view.
Fig. 2—A706, disc diam. 77 mm subumbrellar view.
Figs. 3-4—*Cyanea capillata* L., specimen A705A from Port Phillip Bay, disc diam. 116 mm to show structure of bell-edge.

PLATE 2

Cyanea capillata L. Detail of tentacle. Specimen A705A.

PLATE 3

Pseudorhiza haeckeli Haacke views of specimen A704A, disc diam. 10.6 cm.
Fig. 1—Entire, subumbrellar view.
Fig. 2—Further detail of subumbrellar aspect to show canal structure.
Fig. 3—Entire, exumbrellar view.
Fig. 4—Subumbrellar view of part of medusa to show rhopalium at the bell-edge, lying between two rhopalar lappets.

PLATE 4

Pseudorhiza haeckeli Haacke.
Fig. 1—Exumbrellar view of specimen A704D, preserved, diam. 95 mm, lying out of water upon a black surface. The cross outlined by the gastral filaments is well shown.
Figs. 2-4—Specimen A704B, disc diam. 72 mm.
Fig. 2—Exumbrellar view, entire, showing internal structure of bell, also part of mouth-arms and the large appendage protruding from below disc.
Fig. 3—Exumbrellar aspect of same specimen, further enlarged, showing two rhopalia and internal detail of bell.
Fig. 4—Subumbrellar view of specimen to show canal structure of bell, also mouth-arms and the large single appendage.

PLATE 5

Pseudorhiza haeckeli Haacke, specimen A704C, juvenile, disc diam. 32 mm.
Fig. 1—Exumbrellar view of entire specimen. Note cross outlined within bell by gastral filaments; also canal system, and pattern of exumbrellar nematocyst-warts.
Fig. 2—Subumbrellar view. Note mouth-arms and large single appendage also canal system.
Fig. 3—Side view of same, showing particularly the exumbrellar nematocyst-warts, mouth arms, and large mouth-arm appendage.
Catostylus mosaicus (Quoy and Gaimard), specimen A1130, juvenile, disc diam. 40 mm (to disc turnover).
Fig. 4—Exumbrellar view. Note cross outlined by gastral filaments; also the canal system.
Fig. 5—Subumbrellar view, showing mouth-arms and canal system.

PLATE 6

Bougainvillia ramosa (Beneden). Medusae, preserved, photomicrographs, transmitted light, to varying scales.
Fig. 1—Specimen 1·5 mm high by 1·5 mm wide (bell measurements). Lateral view.
Fig. 2—Specimen with bell 1·0 mm high by 1·0 mm wide, lateral, slightly oblique (towards subumbrellar) view. Note oral tentacles branched dichotomously.
Fig. 3—Specimen with bell 1·8 mm high by 1·6 mm wide, lateral view, showing maturing gonad.
Fig. 4—Specimen with bell 1·2 mm high by 1·2 mm wide. Oblique view, towards a subumbrellar one, showing manubrium and oral tentacles branching dichotomously.

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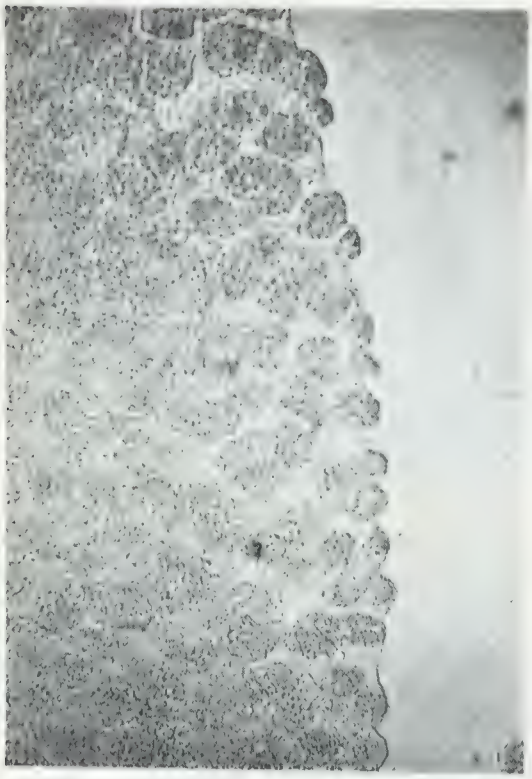

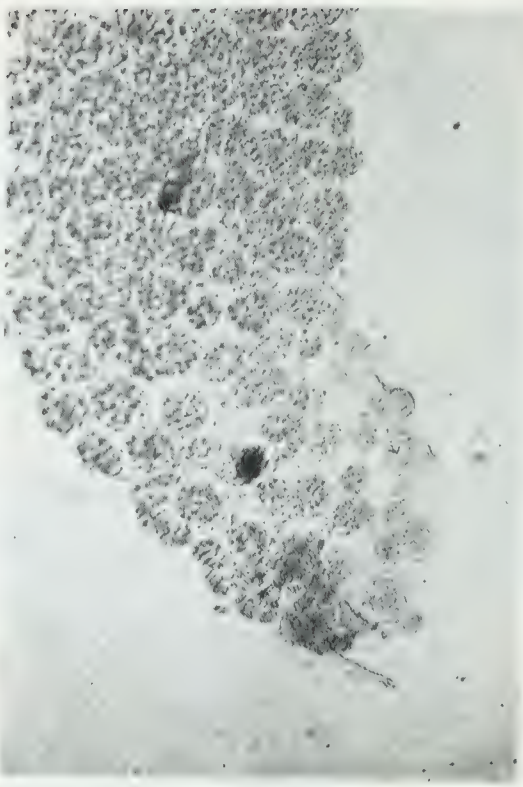

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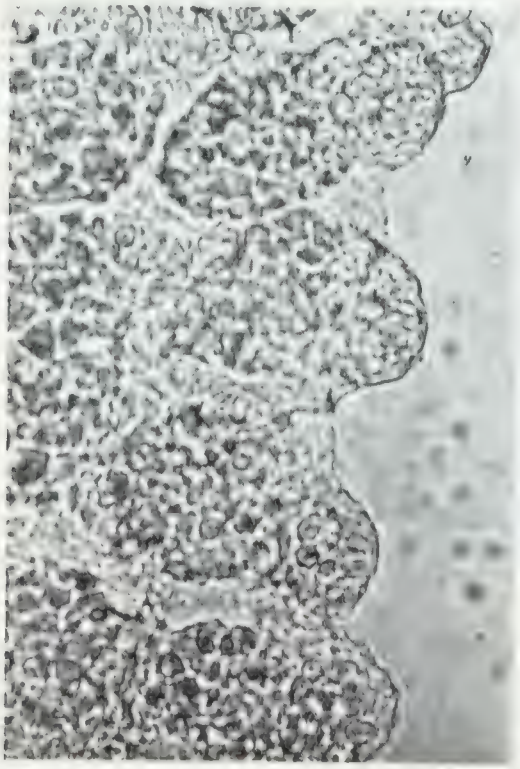

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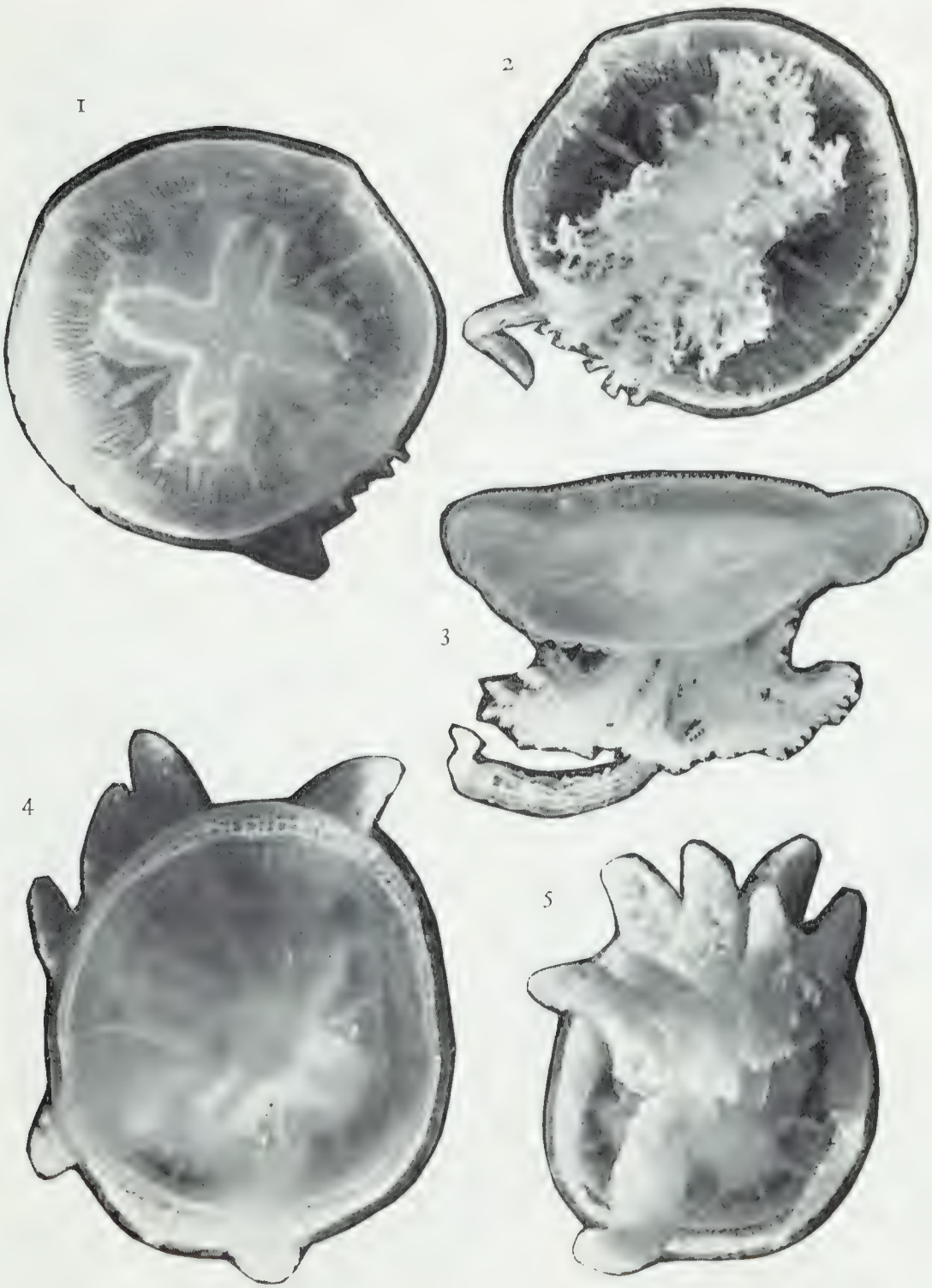
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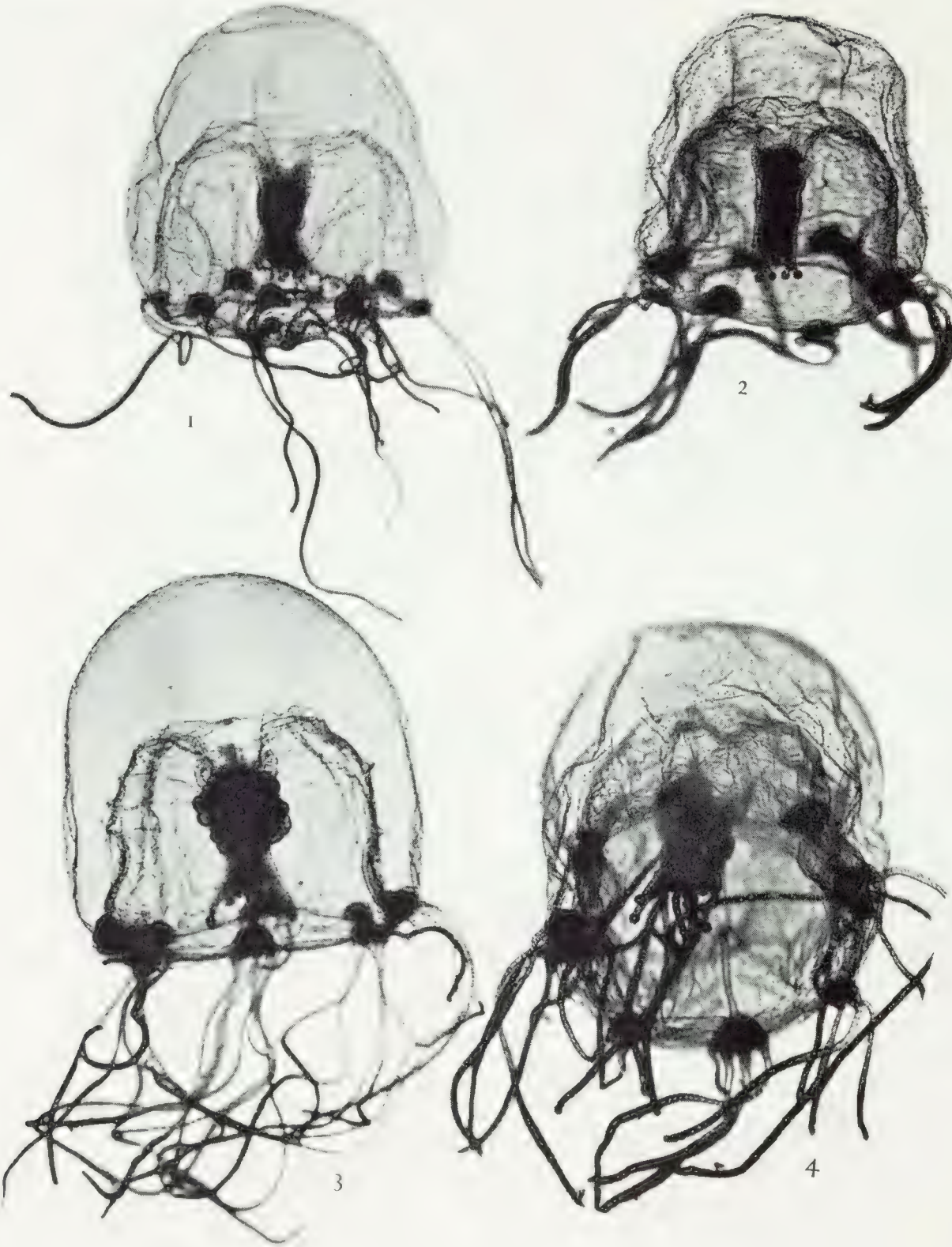
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OCTOCORALLIA

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Abstract

Only 10 octocorals were identified from the samples taken during the survey of Port Phillip Bay. They include one telestacean (*Telesto*), three alcyonaceans (*Parerythropodium* 2 spp and *Chondronephthya* 1 sp., five gorgonaceans (*Mopsella* 4 spp. and *Mopsea* 1 sp.) and one pennatulacean (*Virgularia* 1 sp.). Unfortunately, no stoloniferan such as *Clavularia* spp. collected and reported from the earlier survey (Hickson, 1890) were obtained.

Introduction

The octocoral fauna around the SE. coast of Australia is poorly known from classic works published mostly at the end of the 19th century (e.g. Kölliker 1872, Studer 1878, 1895, Ridley 1884, Wright and Studer 1889, Hickson 1890, Kükenthal 1906, 1919, Thomson and Mackinnon 1911), contrasting with the recent progress of studies on the octocorals in tropical shallow waters of N. Australia and the NE. Great Barrier Reef area.

Among these pioneer zoologists, Hickson (1890) was the first to examine a collection of Alcyonaria and Zoantharia collected by Professor Spencer in the Port Phillip Survey of 1889, and he recorded without detailed descriptions 12 alcyonarians (including two new species of *Clavularia*) and three zoantharians.

At the kind invitation of Mrs J. Hope Black, I have examined the octocorals collected in Port Phillip Bay, 1957-63. The specimens are in the National Museum of Victoria (NMV), and some of the duplicates are retained in the museum of the Seto Marine Biological Laboratory (SMBL).

The present collection consists of *Telesto* (one species), *Parerythropodium* (two species), *Chondronephthya* (one species), *Mopsella* (four species), *Mopsea* (one species) and *Virgularia* (one species), all of which have already been recorded from the SE. Australian coast, some extending down to Antarctica and S. Africa.

Order Telestacea

Family Telestidae Milne Edwards and Haime, 1857

1. **Telesto smithi** (Gray, 1869)

Pl. 7, fig. 1.

Telesto (Alexella) Smithii Gray 1869: 21, fig 1 (Garden Island, Sydney).

Telesto smithi, Ridley, 1884: 334 (Arafura Sea 32-36 fm; Port Molle, Queensland, 12-20 fm).

Telesto smithi, Hickson, 1890: 137-138 (Port Phillip Bay).

Telesto smithii, Laackmann, 1909: 84, fig. E; Pl. 4, fig. 5 (Formosa Strait; Port Jackson, Australia).

Material: Survey Areas 59 (36), 69 (221).

Remarks: All the specimens collected at the two stations range from 2 cm to 15 cm in height and 1-2 mm in diameter. They are mostly erect simple, but sometimes slightly furcately branched in one plane when fully grown. Dirty white to yellowish in colour. Axial polyp is about 5 mm long, 1·5 mm wide. Side polyps are cylindrical to clavate, tapering downwards, 1-4 mm long, 1·2-1·3 mm wide, and alternately arranged with the interval of 3-7 mm long.

Order Alcyonacea

Family Alcyoniidae Lamouroux, 1812 (emend. May, 1900)

2. **Parerythropodium mebranaceum** (Kükenthal, 1906)

Fig. 1; Pl. 7, fig. 2.

Alcyonium (Erythropodium) membranaceum Kükenthal, 1906; 52, Pl. 1, fig. 3; Pl. 9, figs. 42-44 (St Francis Bay, S. Africa, 34°7′3″S, 24°59′3″E, 100 m).

Alcyonium (*Erythropodium*) *membranaceum*, Thomson and Mackinnon, 1911: 665 (11 miles E. of Broken Bay, N.S.W.).

Alcyonium (*Erythropodium*) *membranaceum*, J. St. Thomson, 1921: 159 (Mossel Bay Lighthouse, S. Africa, 10-12 fm; Capt St. Blaize, S. Africa, 12 fm).

Parerythropodium membranaceum, Kükenthal, 1916: 463 (genus name altered and regrouped).

MATERIAL: Survey Area 55 (144). A number of fragments.

REMARKS: The membranous colony broken into pieces is uniformly thin, about 0·5 mm in thickness and ivory buff in colour. On the upper surface mound-like calyces into which zooids are withdrawn are very irregularly scattered with the intervals of 1·5-3·0 mm. They are mostly 2 mm across and 1 mm high.

The anthocodial spicules are warty slender rods or flattened spindles; 0·09 × 0·008, 0·16 × 0·002, 0·018 × 0·02 (in mm). The coenenchymal spicules are quinqueradiate, capstan-like or star-shaped, tuberculate bodies; 0·05 × 0·05, 0·09 × 0·05, 0·09 ×0·09 (in mm).

3. **Parerythropodium hicksoni**, n. sp.

Fig. 2; Pl. 7, fig. 3.

? *Sympodium verrilli* Hickson, 1890: 138 (Port Phillip Bay).

MATERIAL: Survey Area 55 (35). Holotype, Nat. Mus. Vic. G1545 Area 30 (130). Paratype, Nat. Mus. Vic. G1546 and SMBL-Type No. 232.

DESCRIPTION OF HOLOTYPE: A membranous colony wholly covering the shell of a living mussel *Mytilus planulatus* (Lamarck). The specimen in alcohol is creamy white, 3 mm thick in the middle part of the colony, thinner towards the margin, and the texture is rather soft. The zooidal opening is large, about 1·2-2·0 mm in diameter, with the smooth marginal rim not upheaved as mound. They are uniformly all over the upper surface of the membrane with the intervals of 0·5-0·8 mm. The zooids are retractile rather deeply into the gastric cavity; when fully extended, they may attain about 5 mm in length, including contracted tentacles, of which the dorsum forms curved ridge

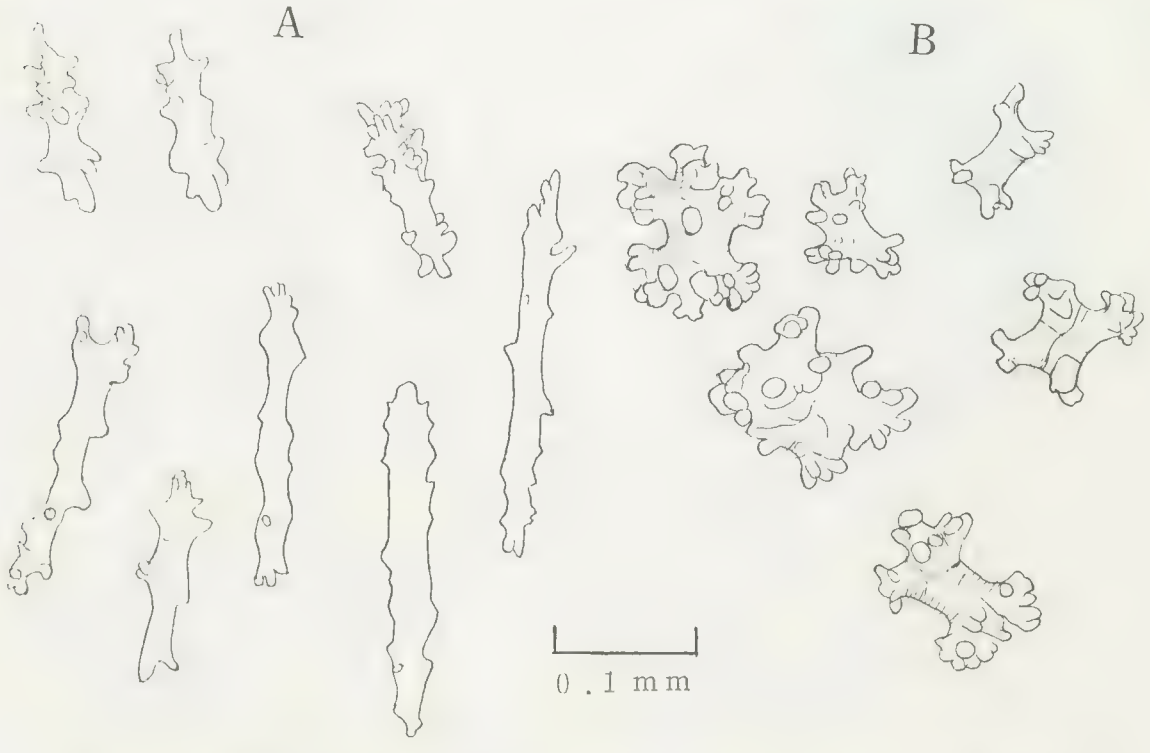


Fig. 1—*Parerythropodium membranaceum* (Kükenthal), Survey 55 (144). A, anthocodial spicules; B, coenenchymal spicules.

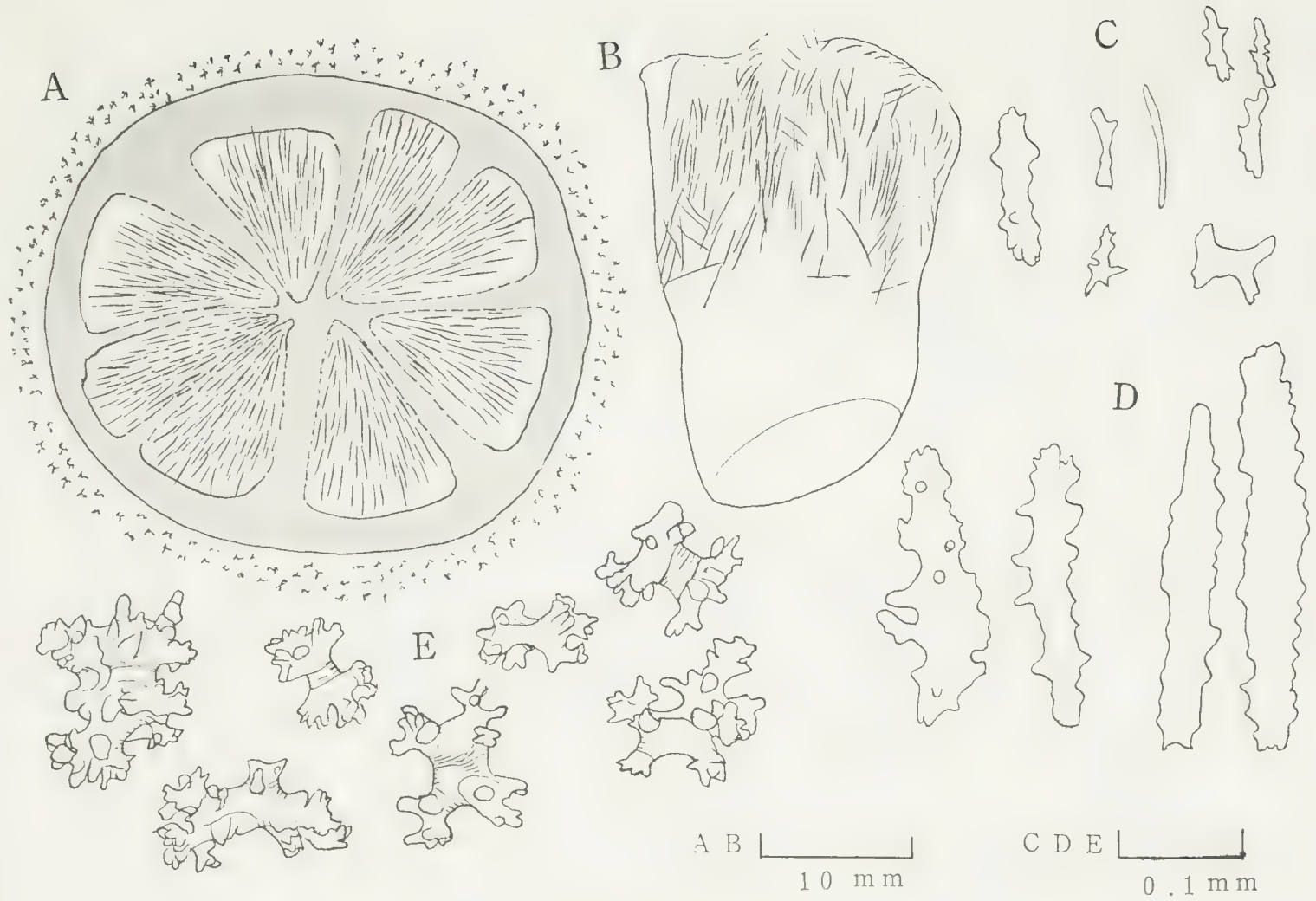


Fig. 2—*Parerythropodium hicksoni* n. sp., holoytpe, Survey Area 55(35). A, a zooid retracted into the zooidal gastric cavity, viewed from above, semidiagrammatic; B contracted zooid, viewed from side; C, spicules from tentacles and pinnules; D, spicules from anthocodia; E, coenenchymal spicules.

provided with numerous spicules lengthwise. These spicules are flattened rods with few excrescences; 0·07 × 0·002, 0·09 × 0·002, 0·2 × 0·035, 0·3 × 0·04, 0·35 × 0·05 (in mm).

The coenenchymal spicules are minute irregular bodies, capstan-like triradiates or quadriradiates, about 0·005-0·1 mm across. Rarely occur also tuberculate spindles; 0·05 × 0·05, 0·07 × 0·06, 0·09 × 0·09 (in mm).

REMARKS: Hickson (1890) assigned a membraneous alcyonacean colony with retractile polyps growing on a piece of alga collected by an earlier Port Phillip Survey to '*Sympodium verrilli*' which was originally collected by HMS *Challenger*, and described by Wright and Studer (1889, p. 271, Pl. 42, fig. 12—spicules only) from the S. of Montevideo, S. America, 600 fm. According to Kükenthal (1916, p. 455), the Challenger specimen is not a real *Sympodium* in his sense but probably a kind of stoloniferan *Clavularia*. In the modern concept of taxonomy, *Sympodium* Ehrenberg, 1834 is a member of the Xeniid alcyonacean (cf. Kükenthal 1916, Bayer 1956). The nearest ally, *Parerythropodium membranaceum* (Kükth.) mentioned above, has similar coenenchymal spicules, but differs from it in having smaller mound-like calyces raised over the thinner membrane. Another ally *P. reptans* (Kükth.), which was originally described from Bouvet Island, Antarctica, 470 m and later recorded from the coast of New South Wales, 30-40 fm (Thomson and Mackinnon 1911), seems to be much different in the structure of spicules and calyces.

Family NEPHTHEIDAE Gray, 1862 (emend. Utinomi, 1954)

4. **Chondronephthya fusca** (Wright and Studer, 1889)

Pl. 7, fig. 4.

Eunephthya fusca Wright and Studer, 1889: 190, Pl. 36, figs. 1a-b (off Port Jackson, *Challenger* Station 163A, 150 fm).

Chondronephthya (n. gen.) *fusca* Utinomi, 1960: 35, Figs. 4-5 (type specimen re-examined and renamed).

MATERIAL: Survey Area 58 (293).

REMARKS: Of five specimens examined, three are sepia-brown coloured, while two are pale brown. They are all flabby in texture, but bilaterally branched in one plane from the erect main stem, about 5 mm across in the middle. The base is expanded to a small membrane. All the polyps are incurved conical, 2 mm long and 1 mm wide; two or three are grouped around the branch or at the end of branches. Their outer covering is very finely granulate and provided with eight deep furrows around the mouth-opening. The characteristic spiculation of polyps and branch cortex is already described and illustrated in detail (cf. Utinomi 1960, fig. 5).

This unique nephtheid seems to be endemic to the SE. coast of Australia.

Order GORGONACEA
Suborder SCLERAXONIA
Family MELITHAEIDAE Gray, 1870

Of the octocorallian collections made in the present survey, the scleraxonian *Mopsella* is dominant, comprising at least four species living S. of the Nepean Bay Bar on a sandy or gravelly bottom adjacent to deep water at the entrance to the Bay, and passing into the open sea (Bass Strait).

5. **Mopsella aurantia** (Esper, 1798)

Fig. 3; Pl. 7, fig. 5.

Mopsella aurantia (Esper) Verrill, 1864: 38 (Synonymy: Australia); Kükenthal, 1919: 161, Pl. 36, fig. 31, Figs. 75-77 (Bintang Is., Singapore); Kükenthal, 1924: 67 (Synonymy); Hickson, 1937: 142, Fig. 18A-C; Stiasny, 1940: 230, Fig. H, Pl. 14, figs. 36-37 (Malay Arch.); Stiasny, 1951: 30 (New Holland).

Melitella retifera (Lamarck), Gray, 1870: 7 (Indian Ocean and Australia).

MATERIAL: Survey Area 58 (293) Portsea Pier, intertidal coll. Area 59 (36), Area 61 (37).

REMARKS: Represented by many specimens, either complete or incomplete, ranging from 10 cm to 15 cm in height where the main stem exists. Anastomosis is rather frequent. In the main and secondary stems the nodes are moderately swollen and distinctly shorter than the slender internodes. Terminal branches are open, generally more slender and gradually taper from the main and secondary stems. The polypal verrucae, which are abundant on one surface and sides, are generally smaller than 1 mm wide and nearly so in height.

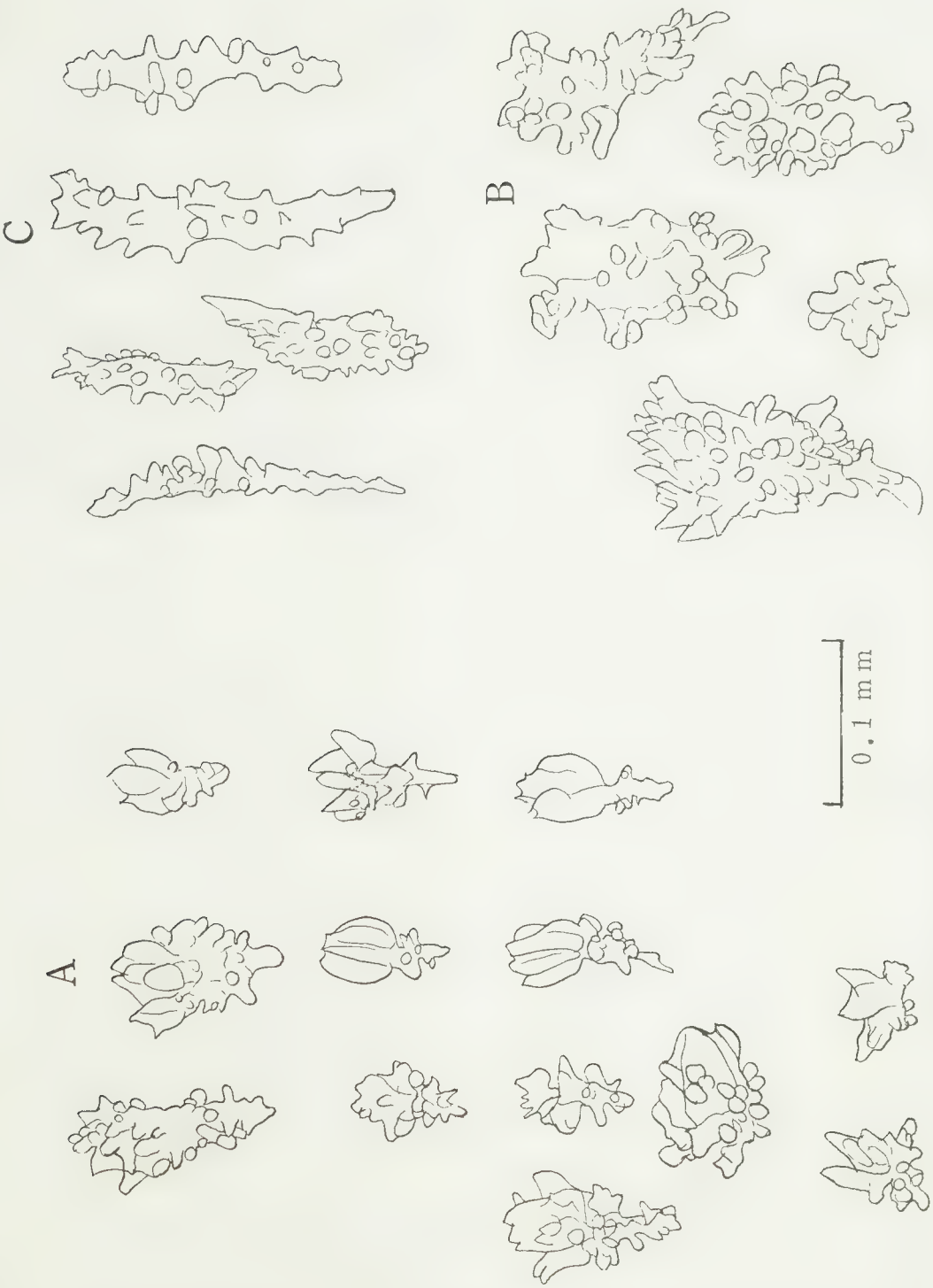


Fig. 3—*Mopsella aurantia* (Esper), Survey Area 58 (293) A, small foliate clubs variable in form, abundant in cortex; B, larger tuberculate clubs or ovate spindles contained in cortex; C, anthocodial spindles.

The colour of the cortex and polyps is very variable between separate colonies; dull yellow, peach-red or orange or dull red with the same coloured polyps. Some are generally dull orange to red on the cortex mottled with yellow polyps. The colour of the denuded axis is different according to the location and colour of the overlying cortex. In dull yellow or orange colonies, the axis of the main stem is generally pink, while the axis of terminal branches is dark red.

The cortical spicules, as illustrated by both Kükenthal and Hickson, consist of foliate clubs with three to five flattened folia apically pointed and a short, often bifurcate, shaft and slightly larger tuberculate clubs, all yellow to orange.

6. **Mopsella zimmeri** Kükenthal, 1908

Fig. 4; Pl. 7, fig. 6.

Mopsella zimmeri Kükenthal, 1908: 199; Kükenthal, 1919: 163, Pl. 36, fig. 32 (Sydney, Australia); Kükenthal, 1924: 68, fig. 50.

Material: Survey area 59 (36), Area 61 (37).

Remarks: The colony is distinctly flabellate and dichotomously branched with a sharp angle; the anastomosis is, however, not so frequent as in *M. aurantia*. The upper stem and branches are somewhat compressed. A complete colony, photographed in fig. 6 of Plate 7, is 13 cm high and 10 cm wide, and uniformly coloured sulphur yellow. Another colony, 12 cm high and 9 cm wide, included in the collection is brick-coloured. Comparing with the adjoining branches, the main stem is short and cylindrical in section. The denuded axis is dull red or fawn in the swollen nodes, while white or pale pink in the furrowed internodes. The calyces scattered on one surface and at sides are longer than wide (e.g. 0·9 mm long and 0·4 mm wide), as compared with those of typical *M. aurantia* (Esper).

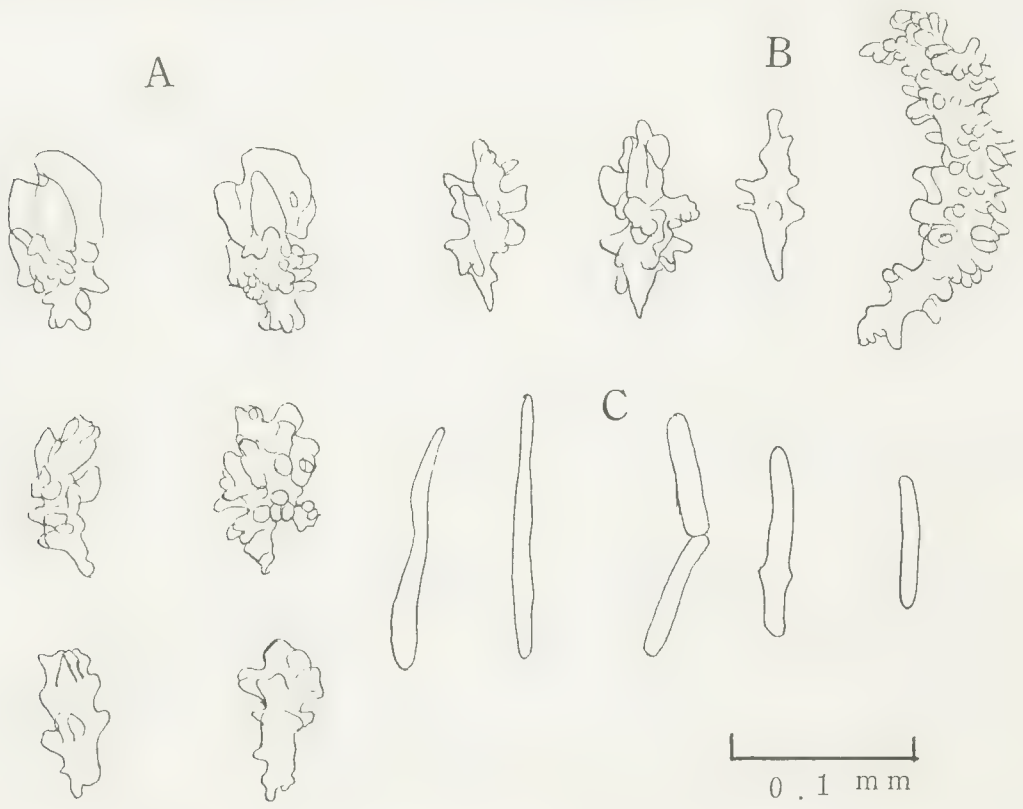


Fig. 4—*Mopsella zimmeri* Kükenthal from Port Phillip Survey Area 61 (37). A, foliate clubs from cortex; B, tuberculate spindles rarely found in cortex; C, smooth rods from nodes.

Spiculation. The cortex contains roundly headed foliate clubs (0·047 × 0·028, 0·033 × 0·028, 0·034 × 0·028, 0·075 × 0·028, 0·09 × 0·07 mm) and sharply ended spindles (0·12 × 0·028, 0·13 × 0·018, 0·2 × 0·028 mm).

Polyp spicules are highly tuberculate spindles (0·12 × 0·028, 0·13 × 0·028, 0·2 × 0·028 mm). All are lemon-yellow coloured. The soft joint (node) of the axis contains transparent colourless rods (0·074 × 0·01, 0·09 × 0·011, 0·15 × 0·014 mm).

In reviewing the species of the family Melitodidae (= Melithaeidae), Hickson (1937, p. 143) tentatively admitted Kükenthal's *zimmeri* as distinct from Esper's *M. aurantia*, although both are closely related to each other. Later Stiasny (1940) synonymized the former with the latter, using specimens from the Malay Archipelago. Kükenthal's key for distinguishing the species of *Mopsella*, especially between *M. aurantia* and *M. zimmeri*, as cited by Hickson, seems to be misleading to later workers, since the mode of branching is highly variable. Notwithstanding, the shape of cortical spicules as figured herein, as well as the external appearance of the colony in respect to the arrangement and shape of calyces, convince me that they should be retained as separate species.

7. **Mopsella clavigera** Ridley, 1884

Fig. 5.

Mopsella clavigera Ridley, 1884: 360, Pl. 37, fig. B; Pl. 38, figs. a-a[111] (Port Curtis, Queensland. 5-11 fm; Port Molle, 14 fm; Thursday Island, Torres Straits, 4-6 fm).

? *M. clavigera*, Thomson and Mackinnon, 1911: 670, Pl. 68, fig. 9 (11 miles E. of Broken Bay, N.S.W., 30-40 fm).

? *M. clavigera*, Nutting, 1911: 49 (Bay of Nangamessi, Sumba, up to 36 m; not figured).

M. clavigera, Kükenthal, 1919: 160 (no new record); Kükenthal, 1924; 66 (no new record).

? *M. clavigera*, Dean, 1932: 12, Fig. 2 (Pulo Mariri, Aru Islands, Malay Archipelago).

M. clavigera, Hickson, 1937: 139, Fig. 17 (Murray Islands, Torres Straits).

MATERIAL: Survey Area 59 (36).

REMARKS: Three orange-red colonies referrable to this species were obtained in the same area, together with one sulphur-yellow colony of *M. zimmeri*, and one pink colony of *M. klunzingeri* described below. The colonies in alcohol are generally brick-red, but when dried they may turn yellowish in the distal part of the colony with reddish-brown calyces scattered over the cortex. They are all flabellate with few anastomoses in the branching. The main stem and branches are not distinguishable by their diameter, as most of the branches are relatively narrow (about 1·5-2 mm wide), and the meshes thus formed are either longitudinally elongate or irregularly polygonal, the distal parts being freely open. The denuded axis is colourless; the nodes in the larger lower stem are 4 mm long, 3-4 mm wide, and the calcareous internodes are 4-5 mm long, 2-2·5 mm wide. The calyces, approximately 0·8 mm across, are scattered on one surface and the sides.

Spiculation. The cortex contains spicules of the following three types, each of which is very variable in form, size and colour:

1. Bluntly ended spindles are coarsely tuberculated. Of these the larger ones are somewhat swollen at one end and somewhat flattened and smooth at the other tapering end, while the smaller ones are less tuberculated on the surface and truncated at both ends. This type is mostly orange or red in colour; 0·06 × 0·02, 0·07 × 0·014, 0·09 × 0·019, 0·1 × 0·02, 0·12 × 0·018 (in mm).

2. Foliate clubs consist of two or three lancetform leaves (i.e. head) and a finely tuberculated, short (often bifurcated, irregularly branched or obsolete) shaft. They are uniformly lemon-yellow, or else the head is lemon-yellow and the shaft orange; 0·05 × 0·018, 0·05 × 0·028, 0·056 × 0·028 (in mm).

3. Smaller spindles with sharp ends, red, rarely occur. The polyp spicules (D) are all slender, sharply ended tuberculate spindles, coloured orange; 0·09 × 0·014, 0·1 × 0·014, 0·75 × 0·03 (in mm).

8. **Mopsella klunzingeri** Kükenthal, 1908

Fig. 6.

Mopsella klunzingeri Kükenthal, 1908: 198; Kükenthal, 1910: 100, Fig. 51; Kükenthal, 1919: 167, Pl. 36, fig. 33; Kükenthal, 1924: 69, Figs. 51-52 (Oyster Harbour near Albany, W. Australia, 3/4-5/2 m).

Mopsella klunzinger, Thorpe, 1928: 518 (and p. 520) (Wooded Is. and Pelsart Is., Abrolhos Group, W. Australia).

Mopsella klunzingeri, Hickson, 1937: 144 (no new locality).

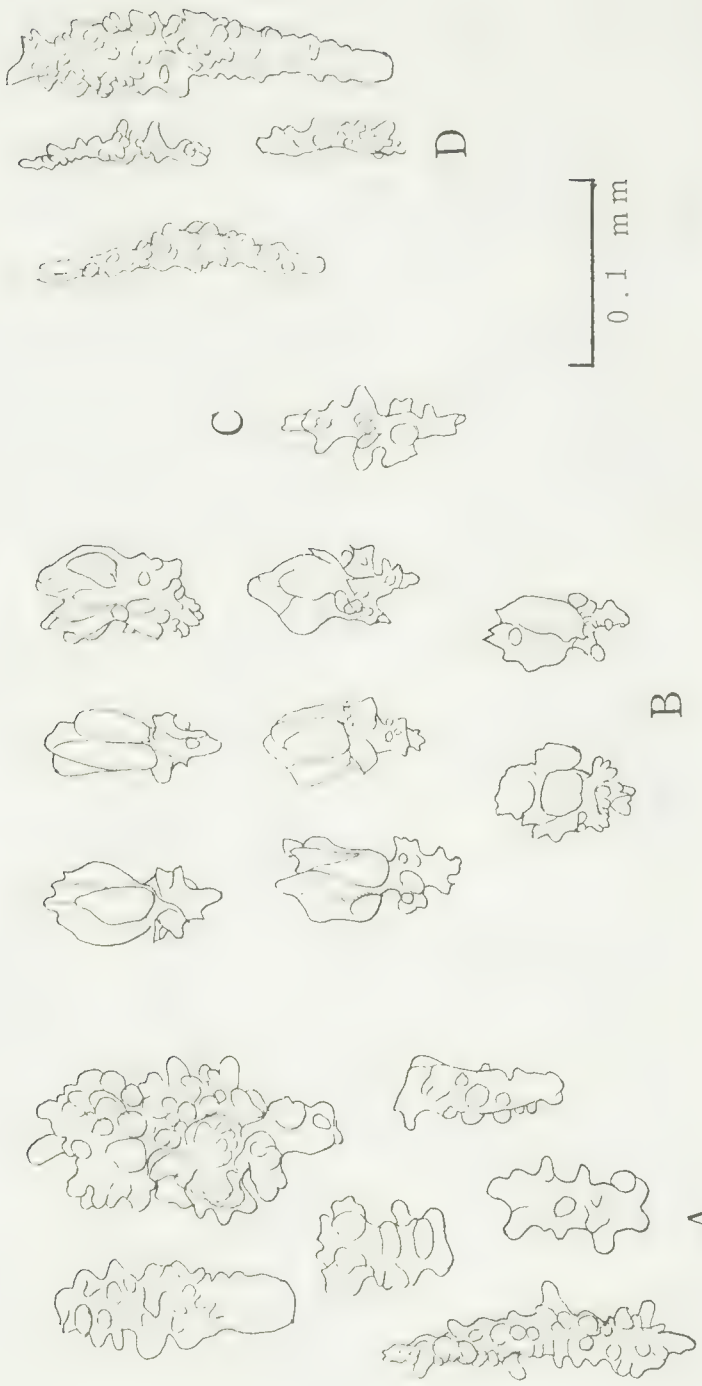


Fig. 5—*Mopsella clavigera* Ridley, Survey Area 59 (36). A, bluntly ended, coarsely tuberculate cortical spicules, either fusiform or somewhat conical in form; B, foliate clubs from cortex; C, smaller tuberculate spindle rarely found in cortex; D, anthocodial spindles.

MATERIAL: Survey Area 59 (36). One specimen.

REMARKS: This beautiful specimen obtained together with the above-mentioned *M. clavigera* seems to be referable to *M. klunzingeri,* hitherto recorded only from W. Australia.

The two main branches followed by a short lower stem are more or less winding as in Kükenthal's photograph (later reproduced as a drawing). As mentioned 'baumartig in einer Ebene' by Kükenthal, the branching is not decidedly flattened but assumes roughly a flabellate form. The cortex is pink and the calyces, irregularly scattered over the surface of its branches, are conical in form, as long as wide (about 1 mm) and pale pink or whitish. The denuded internodes are deep red; in section the lower stem and branches are round, but somewhat flattened and pointed distally. The nodes on which the branches are borne almost at right angles are hardly distinguishable from the adjoining internodes. Anastomosis is rare, so that it may not be said to be 'reticulate'.

Spiculation. The cortex contains orange or colourless, 0-0.15 mm long, strongly tuberculate spindles sharply pointed at both ends and peculiar foliate clubs which consist of very broadened round blades strongly indented at the tip and with a short robust shaft, which appears to be lemon-yellow. No ovate clubs as seen in *M. clavigera* Ridley occur. The greyish brown nodes contain the usual smooth rods marked with a slight swelling in the middle. The polypal spicules are sharply ended spindles, 0·1-0·2 mm long, provided with many whorls of conical warts, pink.

Suborder HOLAXONIA

Family ISIDIDAE Lamouroux, 1812

9. **Mopsea encrinula** (Lamarck, 1816)

Mopsea encrinula (Lm.), Studer, 1878: 665 (NW. coast of Australia, 50 fm); Wright and Studer, 1889: 43, Pl. 7, figs. 1-1b; Pl. 9, fig. 11 (off E. Moncoeur Island, Bass Strait, 38 fm); Thomson and Mackinnon, 1911: 674 (11 miles E. of Broken Bay, N.S.W.)

Mopsea encrinula, Kükenthal, 1919: 620, Figs. 281-283; Pl. 46, figs. 86-87 (Tasmania); Kükenthal, 1924: 438, Fig. 207 (synonymy: Australia, 69-92 m).

MATERIAL: Survey Area 59 (36).

REMARKS: Three incomplete feather-like fragments obtained together may be branches of a large complete specimen, 14 cm in height and 5 mm in diameter, with a membraneous base. The spirally arranged conical polyps around the stem and branches are snowy white in alcohol, while the underlying calcareous axis alternately articulated with narrow horny joints

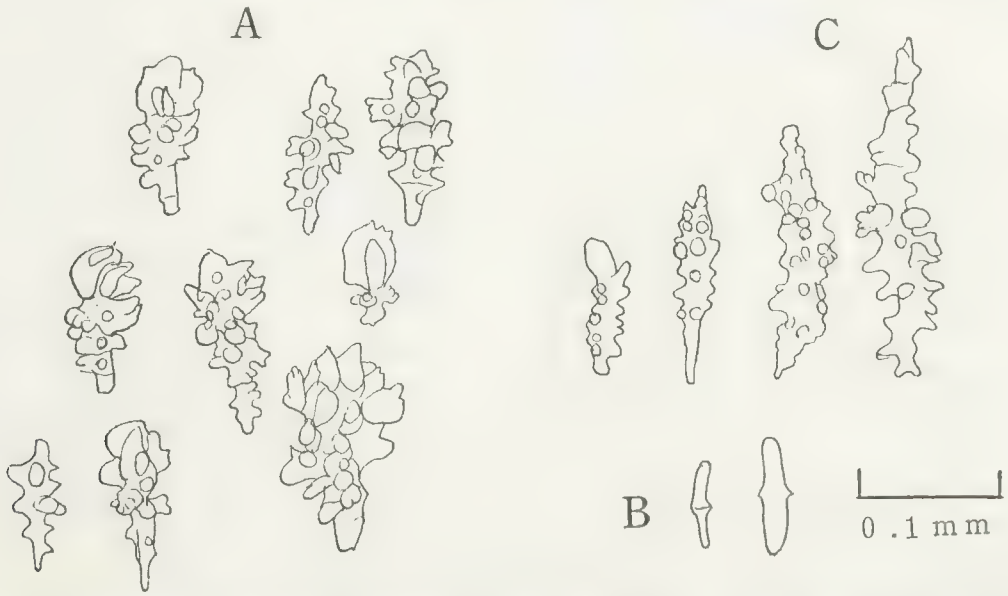


Fig. 6—*Mopsella klunzingeri* Kükenthal, Survey Area 59. A. foliate clubs and spindles coarsely tuberculated around and indented apically, from cortex; B, smooth rods with central swelling from nodes; C, anthocodial spindles.

down to the base is brown. The polyp sculpturing agrees with previous descriptions of this species.

Order PENNATULACEA
Suborder SUBSELLIFLORAE
Family VIRGULARIIDAE Verrill, 1868
10. **Virgularia loveni,** Kölliker 1870
1758)]

Pl. 7, fig. 7.

Virgularia Lovenii Kölliker, 1872: 201, Pl. 13, figs. 121-122 (Port Jackson, N.S.W.); Balss, 1910: 97 (listed on distributional table).

Virgularia lowenii (?), Hickson, 1890: 136-137 (Port Phillip Bay); Kükenthal, 1915: 79.

Virgularia mirabilis (?), Hickson, 1916: 157; Hickson, 1921: 370 (reassigned for the Port Phillip Bay specimens).

MATERIAL: Area 13 (82) 12 specimens; Area 31 (10) (83) (92) 12 specimens and fragments.

REMARKS: The virgulariid sea-pen, abundantly collected from the muddy bottom of the central basin of the bay agrees well with *Virgularia loveni* described originally from Port Jackson by Kölliker (1870, 1872) and later recorded from Port Phillip by Hickson (1890). The largest of complete specimens in the present collection measures 43 mm long and 5 mm wide, of which 23 mm is the rhachis; thus the rhachis occupies about 3/5 of the total length. On both sides of the rhachis, elongate leaves, about 2-2:5 mm long and 1:5 mm high in the upper well developed ones, are arranged alternately. Each of the well-developed leaves in the distal part is composed of about 30 autozooids continuous at the base. It is difficult to trace such a tranverse row of lateral siphonozooids continuous at the base. It is difficult to trace such a transverse row of lateral siphonozooids between the autozooidal leaves as figured by Kölliker (1872). Hickson (1916: 157, 1921: 370) considers the Australian species *V. loveni* as a synonym of *V. mirabilis* originally described from the N. Atlantic many years ago.

References

BALSS, H., 1910. Japanische Pennatuliden. *Abh. math-phys. Klasse Bayer. Akad. Wiss.*, 1. Suppl.-Bd. **10** Abh.

BAYER, F. M., 1956. Octocorallia. *Treatise on Invertebrate Paleontology* (R. C. Moore Ed.) F166-F231.

BROCH, HJ., 1916. Results of Dr. E. Mjöbergs Swedish Scientific Expeditions to Australia 1910-1913, 11. Alcyonarien. *Kngl. Vetenskapsakad. Handl.* **52** (11): 1-48.

DEAN, L. M. I., 1932. Alcyonaria. *Res. Sci. Voyage aux Indes Orientales Néerl. Mém. roy. Hist. Nat. Belg.*, Hors Série, **2** (11): 1-24.

GRAY, J. E., 1869. Descriptions of some new genera and species of Alcyonoid corals in the British Museum. *Ann. Mag. nat. Hist.* 4 (3): 21-23.

————, 1870a. *Catalogue of sea-pens or Pennatulariidae in the collection of the British Museum.* London.

————, 1870b. *Catalogue of Lithopyhtes or stony corals in the collection of the British Museum.* London.

HICKSON, S. J., 1890. Preliminary report on a collection of Alcyonaria and Zonantharia from Port Phillip. *Proc. R. Soc. Vict.* **2**: 136-140.

————, 1916. The Pennatulacea of the Siboga Expedition, with a general survey of the order. *Siboga-Expeditie,* monogr. **14**.

————, 1921. On some Alcyonaria in the Cambridge Museum. *Proc. Cambridge Philos. Soc.* **20** (3): 366-373.

————, 1937. The family Melitodidae. *Trans. zool. Soc. Lond.* **23** (3): 73-212.

KÖLLIKER, A., 1869-1872. *Anatomisch-systematische Beschreibung der Alcyonarien. Erste Abtheilung Die Pennatuliden.* Frankfurt a. M.

KÜKENTHAL, W., 1906. Alcyonacea. *Wiss. Ergebn. deutsch. Tiefsee-Exped. "Valdivia" 1898-1899,* **13**: 1-111.

————, 1910. Alcyonaria. *Die Fauna Südwest-Australiens* (Michaelsen and Hartmeyer Ed.) **3** (1): 1-108.

————, 1915. Pennatularia. *Das Tierreich,* Lief. **43**.

————, 1916. Die Gorgonarien Westindiens, Die Scleraxonier. *Zool. Jahrb. Suppl.* **11** (4): 444-484.

————, 1919. Gorgonaria. Systematischer Teil. *Wiss. Ergebn. deutsch. Tiefsee-Exped. "Valdivia" 1898-1899,* **13** (2).

————, 1924. Gorgonaria. *Das Tierreich,* Lief. **47**.

LAACKMANN, H,. 1909. Zur Kenntnis der Alcyonarien-Gattung *Telesto* Lmx. *Zool. Jahrb. Suppl.* **11** (1): 41-104.

NUTTING, C. C., 1911. The Gorgonacea of the Siboga Expedition. VIII. The Scleraxonia. *Siboga-Expeditie,* monogr. **13b**[5]: 1-62.

RIDLEY, ST. O., 1884. Alcyonaria. *Report on the zoological collections made in the Indo-Pacific Ocean during the voyage of H.M.S. "Alert" 1881-2.* London.

STIASNY, G., 1940. Biological results of the Snellius Expedition. 7. Die Gorgonarien-Sammlung der Snellius Expedition. *Temminckia* **5**: 191-256.

————, 1951. Alcyonides et gorgonides des collections du Muséum National d'Histoire Naturelle (II). 8-Alcyonides et gorgonides d'Australie, Nouvelle-Zélande et Calédonie. *Mém. Mus. Nation. His. Nat.,* N. S. *Zool.* **3** (1): 29-33.

STUDER, TH., 1878. Uebersicht der Anthozoa Alcyonaria, welche während der Reise S. M. S. *Gazelle* um die Erde gesammelt wurden. *Monatschr. K. P. Akad. Wiss. Berlin, Sitz. Phil.-historisch. Klasse,* **1878**: 632-688.

————, 1895. Alcyonarien aus der Sammlung des Naturhistorischen Museums in Lübeck. *Mitt.*

Geogr. Ges. Naturh. Mus. Lübeck **2** (7/8): 103-128.

THOMSON, A. J., and DEAN, L. M. I., 1931. The Alcyonacea of the Siboga Expedition, with an addendum to the Gorgonacea. *Siboga-Expeditie,* monogr. **13**d: 1-227.

THOMSON, J. A., and MACKINNON, D. L., 1911. The alcyonarians of the "Thetis" Expedition. *Mem. Aust. Mus.* **4**: 659-695.

THOMSON, J. ST., 1921. South African Alcyonacea. *Trans. roy. Soc. S. Afr.* **9** (2): 149-175.

THORPE, L., 1928. Alcyonaria of the Abrolhos Islands, Western Australia. *J. Linn. Soc. Lond., Zool.* **36**: 479-531.

UTINOMI, H., 1960. A revision of the nomenclature of the family Nephtheidae (Octocorallia: Alcyonacea). I. The genera *Capnella, Scleronephthya* and *Chondronephthya* (n. g.). *Publs. Seto mar. biol. Lab.* **8** (1): 27-40.

VERRILL, A. E., 1864. List of the polyps and corals sent by the Museum of Comparative Zoölogy to other institutions in exchange, with annotations. *Bull. Mus. Comp. Zool. Harvard Coll.* **1**: 29-60.

WRIGHT, E. P., and STUDER, TH., 1889. Report on the Alcyonaria collected by H.M.S. Challenger during 1873-76. *Rep. Sci. Res. Challenger, Zool.* **31** (4).

Plate 7

Fig. 1—*Telesto smithi* (Gray), branched specimen. ×1.3.

Fig. 2—*Parerythropodium membranaceum* (Kükenthal). ×1.

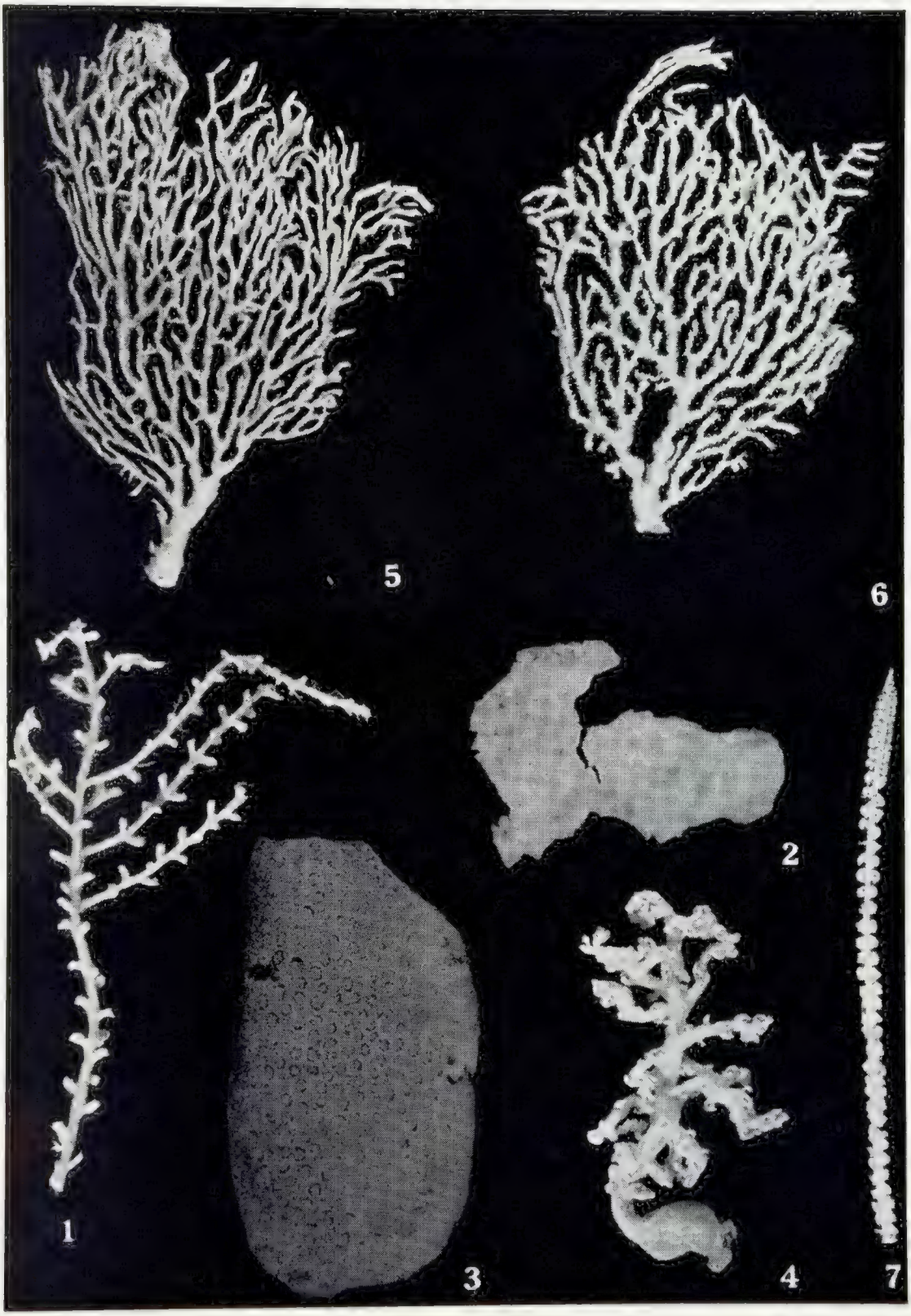
Fig. 3—*Parerythropodium hicksoni*, n. sp., holotype specimen. ×1.4.

Fig. 4—*Chondronephthya fusca* (Wright and Studer). ×1.

Fig. 5—*Mopsella aurantia* (Esper). ×2/3.

Fig. 6—*Mopsella zimmeri* Kükenthal. ×2/3.

Fig. 7—*Virgularia loveni* Kölliker. ×1.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OCCURRENCE OF *SOLANDERIA FUSCA* (Gray, 1868) (HYDROZOA) IN PORT PHILLIP BAY, VICTORIA

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Abstract

Solanderia fusca (Gray, 1868) is recorded for the first time from Victorian coastal waters. The specimens are briefly described and notes given on ecology.

Introduction

Ralph (1966) did not report *Solanderia fusca* among the hydroids examined by her. This hydroid was, however, taken during the survey, but because of its strong resemblance to the Gorgonacean octocorals, the specimens were included in the latter collections.

Material: Survey Area 59 (36) Popes Eye.

Class Hydrozoa

Suborder Athecata

Family Solanderiidae Marshall, 1892

Solanderia fusca (Gray, 1868)

Ceratella fusca Gray, 1868: 579, Fig. 2; Bale, 1884: 48-50; 1888: 748; Spencer, 1891: 8-24, Figs. 1-14.

Description

Three small colonies broken off from the rootstock were collected by SCUBA divers. The largest colony, roughy fan shaped, measures 10 cm in height and 11 cm in width (Pl. 1, fig. 1) and consists of two flexuous stems 3 mm in width united at the base, giving rise to a series of dense reticulating branches and branchlets, the whole colony flattened in the plane of growth.

The specimens show little difference in structure from the description given by Spencer (1891) of specimens from New South Wales, Lord Howe Is., and Flinders Is. in Bass Strait.

The large shelf-like hydropores are formed from a variable number (up to fifteen) of short spatulate spines connected together by a delicate chitinous web. Similar spines project thickly from the trabeculae of the branches, particularly in the older parts of the colony, giving the surface of the branch a characteristic prickly appearance (Pl. 1, fig. 2).

This was not noted by Spencer, and it was thought possible that his specimens may have been water worn. However, examination of well-preserved material from both New South Wales and S. Australian waters showed the spines in these specimens to be poorly developed or missing altogether. Evidently, this feature may be a local variation of the species in Victorian waters.

The hydranths are moderately well extended, showing the randomly scattered capitate tentacles typical of the species, but are not sufficiently expanded to allow a tentacle count to be made. In young branches, the hydranths are alternate and prominently seated on the hydrophores, but in older branches this alternate arrangement tends to be lost, and both hydrophore and hydranth become increasingly submerged in the trabeculate meshwork of the branch. Branching in the distal parts of the

colony is roughly alternate. Each new branch begins from the outgrowth of the spines of a hydrophore, which elongate to form the basic, approximately longitudinal meshwork of the branch. Colour: older stems and branches dark brown, shading through lighter brown to almost white at the growing tips. Hydranths white. The colonies are infertile.

Remarks

Solanderia fusca is a conspicuous athecate hydroid of the southern Australian coastline, with a present known distribution from Sydney, N.S.W., to the Great Australian Bight (J.E.W.). Although it has not previously been recorded from Victorian coastal waters, it is found in and around Port Phillip Heads and is common at Popes Eye (Area 59) which is the northernmost extension of its range into Port Phillip Bay.

It favours fairly clear, well-agitated shallow ocean water, with a maximum development between 3 and 15 m, but is also occasionally found in deeper water, and in deep permanent tide pools in ocean shore platforms of Bass Strait.

It usually occurs in clusters of one to three stems growing outward from a spreading root-like base directly attached to vertical rocky faces, or downward from the underside of ledges.

Acknowledgements

We thank the Director, Mr J. McNally and Mrs J. Hope Black of the National Museum of Victoria for the opportunity to examine this material, and Mr Cha Araga for the photographs.

References

Bale, W. M., 1889. On some new and rare Hydroida in the Australian Museum collections. *Proc. Linn. Soc. N.S.W.* 2 (3): 745-799.

Gray, J. E., 1868. Notes on the Ceratelladae, a family of keratose sponges. *Proc. zool. Soc. Lond.* 1868: 575-579.

Millard, N. A. H., 1966. The hydrozoa of the south and west coasts of South Africa. Pt. 3. The Gymnoblastea and small families of Calyptoblastea. *Ann. S. Afr. Mus.* 48 (18): 427-487.

Ralph, Patricia M., 1966. Port Phillip Bay Survey. Hydroida. *Mem. natn. Mus. Vict.* 27: 157-166.

Spencer, W. B., 1891. On the structure of *Ceratella fusca* Gray. *Trans roy. Soc. Vict.* 2: 8-24.

Vervoort, W., 1962. A redescription of *Solanderia gracilis* Duchassaing and Michelin, 1846, and general notes on the family Solanderiidae (Coelenterata, Hydrozoa). *Bull. mar. Sci. Gulf Carrib.* 12 (3).

Wineera, J. S., 1968. The histology of a species of *Solanderia* Duchassaing and Michelin, 1846. *Zool. Publs Univ. Wellington* No. 42-46.

Explanation of Plate 8

Fig. 1—*Solanderia fusca* (Gray, 1868). Largest colony from Area 59, × 2/3.

Fig. 2—Detail of branches showing partly extended hydranths and spinous trabeculae. Younger branch at right shows shelf-like hydrophores × 20.


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POLYCHAETA

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Summary

An account is given of 63 species of polychaetes collected from Port Phillip Bay, Victoria. Of these eight are described as new species, eight represent new records for the Australian region, and a further 21 are recorded from the Victorian coasts for the first time.

Introduction

This paper gives an account of the Polychaeta collected during the ecological survey of Port Phillip Bay. The Polychaeta of the Australian region are as yet incompletely known and there are many gaps in the geographic coverage of studied collections. Port Phillip Bay lies within the cold-temperate Maugean Province as defined by Bennett and Pope (1960) and Knox (1963). This includes the coast E. of Robe in S. Australia, the Victorian coast, and Tasmania. Within the this region, the Victorian coast as a whole is a region of overlap between warm and cold temperate elements, and this is reflected in the polychaetes recorded.

McIntosh (1885), during the course of the 'Challenger' expedition, obtained the first polychaetes from this region, six species from 38 fm in Bass Strait. Benham (1915-16) recorded 24 species from the Victorian coast in his report on the polychaetes obtained by the F.I.S. 'Endeavour'. Augener (1922) in his account of the polychaetes from SE. and S. Australia collected by the Mortensen Pacific Expedition recorded 21 species, mainly from Port Hacking, but also including two species, *Glycera americana* and *Maldane sarsi*, from Port Phillip. In her review of the Nereidae Hartman (1953) included two species from Victoria.

The present collection comprises 63 species of which three have been determined to the genus only. Of the remaining 60 species, 44 have been recorded previously from the Australian region, eight comprise new records for the region and eight are new species. Twenty-one of the 44 species are recorded from the Victorian coast for the first time.

Holotypes and paratypes of new species described in this paper are deposited in the National Museum of Victoria.

Acknowledgements

We are grateful to Mr J. McNally, Director, for the opportunity of reporting on this interesting collection.

Species List

Family Polynoidae
- *Harmothoe spinosa* Kinberg, 1855
- *Malmgrenia phillipensis* n.sp.
- *Paralepidonotus ampulliferus* (Grube, 1878)
- *Polyeunoa* sp.

Family Sigalionidae
- *Sigalion ovigerum* Monro, 1924

Family Phyllodocidae
- *Eteone platycephala* Augener, 1913
- *Eulalia (Pterocirrus) magalhaesnsis* Kinberg, 1857
- *Notophyllum splendens* (Schmarda, 1861)
- *Phyllodoce duplex* McIntosh, 1885

Family Hesionidae
- *Nerimyra longicirrata* n.sp.

Family Syllidae
Subfamily Eusyllinae
- *Eusyllis brevicirrata* n.sp.

Subfamily Syllinae
- *Syllis kinbergiana* Haswell, 1885
- *Trypanosyllis zebra* (Grube, 1860)

Family Nereidae
- *Ceratonereis costae* (Grube, 1840)
- *Ceratonereis mirabilis* Kinberg, 1866
- *Nereis cockburnensis* Augener, 1913
- *Nereis (Neanthes) caudata* Delle Chiaje, 1841
- *Perienereis amblyodonta* (Kinberg, 1865)
- *Perinereis nuntia brevicirris* (Grube, 1857)
- *Platynereis australis* (Schmarda, 1861)

Family Nephtydae
- *Nephtys picta* Ehlers, 1868

Family Glyceridae
Glycera americana Leidy, 1855
Hemipodus australiensis n.sp.
Family Goniadidae
Goniada emerita Audouin & Milne Edwards, 1883
Family Eunicidae
Subfamily Eunicinae
Eunice antennata (Savigny, 1820)
Eunice australis Quatrefages, 1865
Eunice tentaculata Quatrefages, 1865
Eunice (Palolo) siciliensis Grube, 1840
Lysidice ninetta Audouin & Milne-Edwards, 1883
Subfamily Onuphinae
Diopatra aciculata n.sp.
Onuphis (Nothria) holobranchiata Marenzeller, 1879
Subfamily Lysaretinae
Oenone fulgida (Savigny, 1818)
Subfamily Lumbrinerinae
Lumbrineris latreilli Audouin & Milne Edwards, 1834
Subfamily Arabellinae
Arabella iricolor iricolor (Montagu, 1804)
Subfamily Dorvillelnae
Dorvillea australiensis (McIntosh, 1885)
Family Cirratulidae
Cirriformia filigera (Delle Chiaje, 1825)
Cirriformia tentaculata (Montagu, 1808)
Family Chaetopteridae
Chaetopterus variopedatus (Renier, 1804)
Family Orbiniidae
Haploscoloplos kerguelensis (McIntosh, 1885)
Family Opheliidae
Armandia lanceolata Willey, 1905
Family Maldanidae
Asychis glabra n.sp.
Family Pectinariidae
Pectinaria antipoda Schmarda, 1861
Family Terebellidae
Subfamily Trichobranchiinae
Terebellides stroemi Sars, 1835
Subfamily Polycirrinae
Polycirrus porcata n.sp.
Subfamily Thelepinae
Thelepus setosus (Quatrefages, 1865)
Subfamily Terebellinae
Amphitrite rubra (Risso, 1828)
Artacamella dibranchiata n.sp.
Axionice harrissoni (Benham, 1916)
Eupolymnia nebulosa (Montagu, 1818)
Lanice conchilega (Pallas, 1776)
Pista typha (Grube, 1878)
Family Sabellidae
Subfamily Sabellinae
Branchiomma cingulata (Grube, 1870)
Sabellastarte indica (Savigny, 1826)
Sabellastarte longa (Kinberg, 1867)
Subfamily Fabriciinae
Myxicola infundibulum (Renier, 1804)
Family Serpulidae
Subfamily Spirorbinae
Spirorbis (Paralaeospira) antarcticus Pixell, 1913
Spirorbis (Paralaeospira) sp.
Subfamily Serpulinae
Pomatoceros terraenovae Benham, 1927
Salmacina dysteri (Huxley, 1855)
? *Serpula* sp.
Temporaria polytrema (Phillippi, 1884)
Vermiliopsis acanthophora Augener, 1914
Vermiliopsis infundibulum Linnaeus, 1788

Family Polynoidae Malmgren 1867

Genus **Harmothoe** Kinberg, 1885

Harmothoe spinosa Kinberg, 1855

Harmothoe spinosa Kinberg, 1857-1910: 21, Pl. 31, fig. 31.
Harmothoe spinosa: Fauvel, 1916: 421, Pl. 8, figs. 8-9.

Material: Areas 5 (169) 17 (= number of specimens) (53) 1, 6 (137) 19, 7 (123) 8, (204) 5, 9 (178) 20, 10 (103-6) 4, 11 (190) 2, (195) 8, 12 (112-4) 2, 13 (92) 15, 14 (8) 1, (95) 2, 17 (170) 1, 19 (306) 1, 23 (7) 3, 24 (122) 1, 27 (47) 3, (138) 3, 28 (286) 2, 31 (10) 3, 31 (310) 1, 49 (237) 2, 51 (270) 6, 55 (148) 2, 59 (214) 1, 61 (239) 3, 63 (16) 2, (19-21) 9, (162) 2, 67 (216) 1, 69 (97) 7.

Remarks: There are numerous specimens of this highly variable species. The maximum size is 50 mm. This is much smaller than the size range of the specimens recorded from Antarctica, which measure up to 120 mm. The development of the elytral fringe is highly variable both in the elytra on any one specimen as well as between elytra on different individuals. Only a few individuals have elytra with the globular vesicles which are often characteristic of the Antarctic specimens.

Genus **Malmgrenia** McIntosh, 1874

Malmgrenia phillipensis n.sp.

Figs. 1-6

Material: Areas 14 (175) 2, 31 (10) 1.

Description:

Size: Length of body up to 20 mm, width including parapodia 6 mm, segments number 38.

Colour in Alcohol: Dorsum reddish brown to cream, ventrum pale cream, lateral antennae and dorsal cirri brown.

Prostonium: Fig. 1. Slightly broader than long, without peaks; two pairs of eyes, the posterior pair small, circular, and situated dorsally at the hind margin of the prostomium; the anterior pair larger, oval and more widely spaced, situated in the middle region of the prostomium and on the extreme lateral margins.

Lateral antennae short, tapering to fine points, inserted subterminally and sparsely covered with fine papillae; median antenna with a large ceratophore, stout, tapering to a fine point and nearly 2·5 times the length of the laterals. Palps large, very stout at the base and tapering sharply.

Elytra: Fig. 2. 15 pairs, completely covering the dorsum and overlapping middorsally. They are oval with lateral notches, translucent in the smaller specimens, and with an anterior pigment patch and pigmented border in the larger specimens, the pigment composed of hexagonal granules (Fig. 3). In all specimens the elytra are characterized by having two longitudinal parallel ridges running two thirds the length of the dorsal surface (Fig. 5). Elytral tubercles absent, except for a small number of minute tubercles on the posterior quarter. Elytra without fringe.

Parapodia: Fig. 4. Dorsal cirri long and tapering, sparsely covered with fine papillae; ventral cirri short and finger-like with a fine tip. Notopodium short with a projecting acicular lobe; neuropodium with a prominent distal acicular lobe.

Setae: Notosetae 20-30 in number, translucent, moderately stout, slightly curved, tapering gradually to somewhat blunt conical tips, and with transverse rows of fine serrations (Fig. 5). Neurosetae 30-40 in number, slender, translucent; the upper supra-acicular ones with long spinous regions and faintly bifid tips; lower supra-acicular ones stouter with a more prominent secondary distal tooth. Subacicular neurosetae with shorter, somewhat enlarged spinous regions and more pronounced claw-like bifid tips (Fig. 6).

HOLOTYPE G1736 and TWO PARATYPES G1737: Nat. Mus. Vict. Coll.

TYPE LOCALITY: Area 31 (10).

REMARKS: Species of this genus are usually commensal with echinoderms, but in this case there is no information available on its habitat. It most closely resembles *M. marquesensis* in general appearance but differs in having papillae on the lateral antennae and dorsal cirri, in the shape and number of spinous rows on the setae, and in having pronounced longitudinal ridges on the elytra; this lattermost character is not found in any other species.

Malmgrenia phillipensis n.sp.
Fig 1—Prostomium and first segment in dorsal view.
Fig. 2—Typical elytral surface.
Fig. 3—Enlarged view of elytral pigment spots.
Fig. 4—Typical parapodium in posterior view.
Fig. 5—Two typical notosetae.
Fig. 6—A subacicular neuroseta.

Genus **Paralepidonotus** Horst, 1915
Paralepidonotus ampulliferus (Grube, 1878)

Lepidonotus ampulliferus Gravier, 1901: 214, Pl. 7, figs. 111-113.
Paralepidonotus ampulliferus: Day, 1967: 47-48, Figs. 1.4a-f

MATERIAL: Area 5 (169) 1.

REMARKS: The single specimen agrees perfectly with Gravier's and Day's descriptions. The elytra have the characteristic large flask shaped vesicles along their posterior margins. This is the first record of this species from Australia.

Genus **Polyeunoa** McIntosh, 1885
Polyeunoa sp.

MATERIAL: Area 5 (169) 2.

REMARKS: Two anterior fragments which cannot be positively identified. The elytra have a broad band of brown pigment on their inner margins.

Family SIGALIONIDAE Malmgren, 1867
Genus **Sigalion** Audouin & Milne Edwards, 1832
Sigalion ovigerum Monro, 1924

Sigalion ovigerum Monro, 1924: 47, Figs. 10-12.

MATERIAL: Area 69 (222) 1.

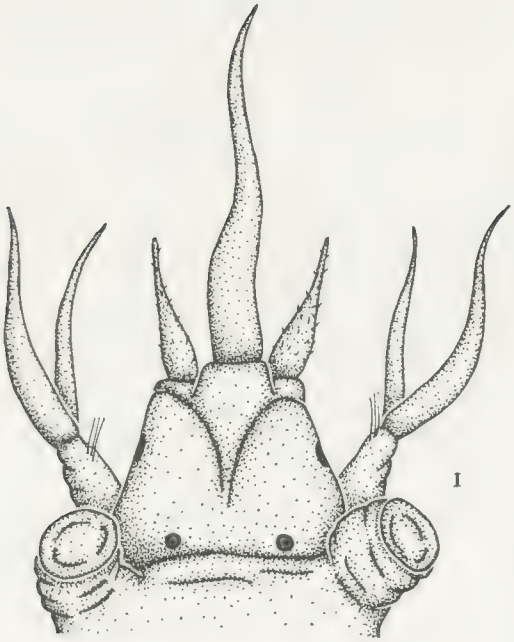
REMARKS: Typical. Recorded previously from Port Jackson.

Family PHYLLODOCIDAE Williams, 1852
Genus **Eteone** Savigny, 1818
Eteone platycephala Augener, 1913

Eteone platycephala Augener, 1913: 136, Pl. 3, figs. 44-45, Fig. 9a-b.

MATERIAL: Area 5 (169) 2.

REMARKS: Typical. Recorded previously from W. Aust.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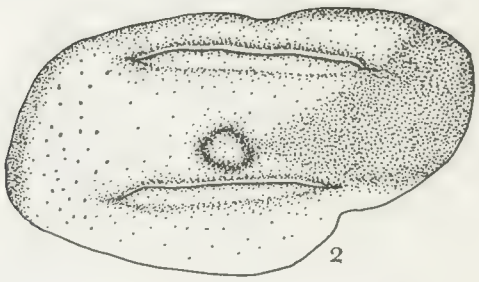
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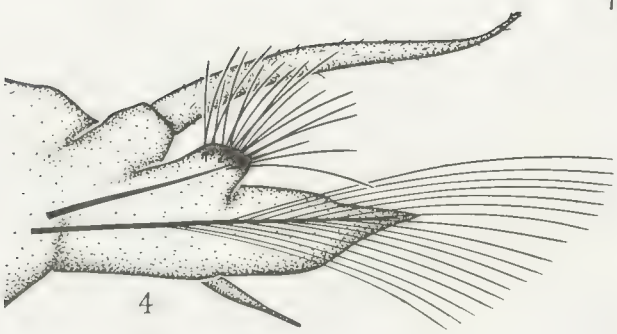
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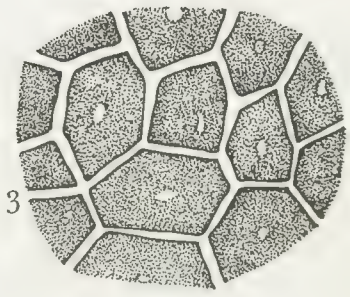
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Genus **Eulalia** Savigny, 1818
Eulalia (Pterocirrus) magalhaensis Kinberg, 1857

Eulalia magalhaensis Kinberg, 1857-1910: 55, Pl. 33, fig. 1.
Eulalia (Pterocirrus) magelhaensis: Fauvel, 1932: 77.

MATERIAL: Areas 14 (95) 1, 61 (37) 1.

REMARKS: Typical. Recorded previously from Port Jackson, N.S.W., Spencer's Gulf and St. Vincent's Gulf, S. Aust., and Derwent River, Tasm.

Genus **Notophyllum** Oersted, 1843
Notophyllum splendens (Schmarda, 1861)

Macrophyllum splendens Schmarda, 1861: 82, Pl. 9, fig. 227.
Notophyllum splendens: Augener, 1913: 140, Fig. 2.

MATERIAL: Area 66 (292) 1.

REMARKS: Typical. This is an Indo-Pacific species previously recorded from Sharks Bay.

Genus **Phyllodoce** Savigny, 1818
Phyllodoce duplex McIntosh, 1885

Phyllodoce duplex McIntosh, 1885: 167, Pl. 27, fig. 8; Pl. 32, fig. 9; Pl. 15A, fig. 1.
Phyllodoce duplex: Augener, 1913: 126.

MATERIAL: Area 69 (222) 1.

REMARKS: Typical. Previously recorded from Two Fold Bay, N.S.W., by McIntosh (1885) in 150 fm.

Family HESIONIDAE Malgram, 1867
Genus **Nerimyra** Blainville, 1828
Nerimyra longicirrata n.sp.
Figs. 7-10

MATERIAL: Area 39 (314) 1.

DESCRIPTION:

Size: Length of body 12 mm, width including parapodia 5 mm, segments number 36.

Colour in Alcohol: Cream, with green markings on the dorsal surface in the median region.

Prostomium: Fig. 7. Broadly rounded; about twice as broad as long; two pairs of prominent brown eyes, the anterior pair being much the larger and more widely spaced. A pair of slender bi-articulate palps tapering to fine points and a pair of prostomial tentacles about equal in size to the palps. Anterior segments fused dorsally and possessing six pairs of tentacular cirri about one and a half times the length of the prostomial tentacles.

Parapodia: Fig. 8. Uniramous, but with the dorsal cirri supported by a pair of acicula from which arise a small number of fine capillary setae. Parapodial lobe tapering to a point and supported by a single aciculum; dorsal cirri long, thin and tapering arising from short cirrophores; ventral cirri short, extending just beyond the tip of the parapodial lobe.

Setae: A small number of capillary notosetae (Fig. 9); neurosetae compound heterogomph falcigers with long pieces terminating in fine hooks and serrated along the lateral edge (Fig. 10).

HOLOTYPE: G1738 Nat. Mus. Vict. Coll.

TYPE LOCALITY: Area 39 (314).

REMARKS: This is a small genus with nine recorded species of which only two, *N. blacki* (Knox 1960) and *N. crinita* (Haswell 1886) have been recorded from the southern hemisphere. The present specimen differs from *N. blacki* in the shape of the prostomium, in possessing prominent eyes, in the shape of the prostomial antennae, and the length of the dorsal cirri; the parapodia are similar in general shape but *N. longicirrata* differs in having bidentate and pieces to the compound setae. *N. longicirrata* differs from *N. crinita* in the general shape of the prostomium, in lacking a median antenna, in having longer dorsal cirri, and in the size of the notopodium.

Nerimyra longicirrata n.sp.
Fig. 7—Anterior end in dorsal view.
Fig. 8—Typical parapodium in posterior view.
Fig. 9—Notoseta.
Fig. 10—Compound neuroseta.

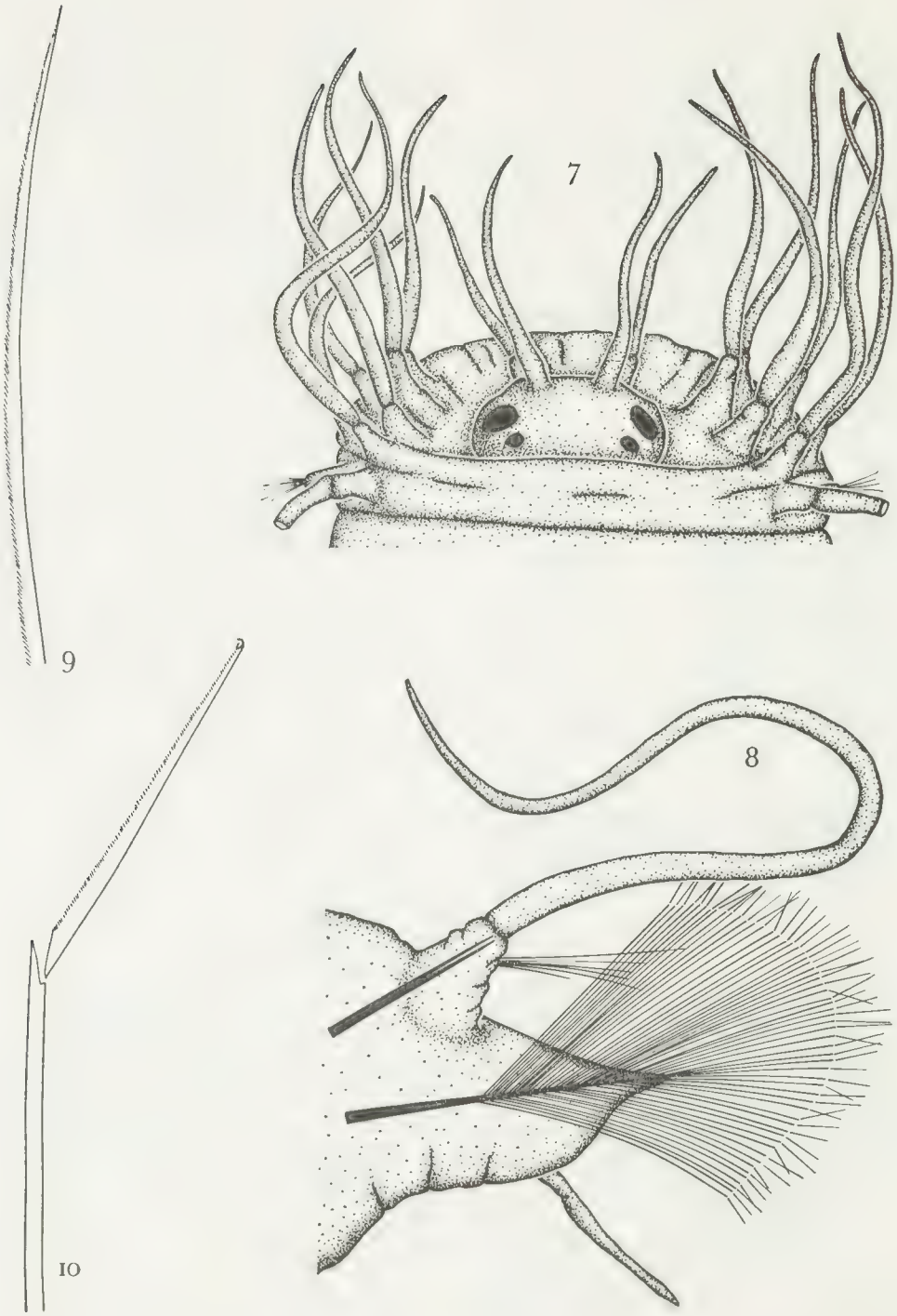
Family SYLLIDAE Grube, 1850
Sub-family EUSYLLINAE Rioja, 1925

Genus **Eusyllis** Malmgren, 1867
Eusyllis brevicirrata n.sp.
Figs. 11-14

MATERIAL: Areas 9 (178) 3, 16 (283) 2, 25 (129) 4, 28 (286) 1, 37 (40) 1, 51 (270) 1.

DESCRIPTION:

Size: None of the specimens is complete but the longest fragment measures 20 mm for about 100 anterior segments; width including parapodia up to 3·5 mm.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Colour in Alcohol: Uniformly light cream to yellow.

Prostomium: Fig. 11. About three times as broad as long, rounded in front and partially obscured posteriorly by the first segment; two pairs of eyes, also partially obscured, in a straight line across the hind margin of the prostomium. Median antenna wrinkled, tapering to a blunt tip and equal in length to about four segments; lateral antennae similar but slightly shorter; a pair of large ventrally directed palps, united at the base.

Pharynx: Chitinised with a single large anterior tooth, an entire rim, and a ring of large soft papillae.

Peristomium: With two pairs of tentacular cirri, slightly shorter than the succeeding dorsal cirri.

Parapodia: Fig. 12. Dorsal cirri stout, slightly tapering, faintly annulated and equal in length to about two thirds the body width. Ventral cirri short, pointed, not extending beyond the tip of the setigerous lobes.

Setae: All compound falcigers, the end pieces varying from short and stout (Fig. 14) to long and thin (Fig. 13); all bidentate.

HOLOTYPE G1739 and 11 PARATYPES G1740-5: Nat. Mus. Vict. Coll.

TYPE LOCALITY: Area 9 (178).

REMARKS: This species has the strongly rounded dorsum which is characteristic of the genus. It is distinguished from the other described species by its larger size, greater number of segments (40-70 being characteristic of typical species), more elongated and pointed ventral cirri, and the relatively short dorsal cirri.

Sub-family SYLLINAE Rioja, 1925

Genus **Syllis** Savigny, 1818

Syllis (Typosyllis) kinbergiana Haswell, 1885

Syllis (Typosyllis) kinbergiana Haswell, 1885: 7, Pl. 5, figs. 1-3.
Syllis (Typosyllis) kinbergiana: Haswell, 1920: 98, Pl. 11, figs. 23-27; Pl. 12, figs. 1-2.

MATERIAL: Area 55 (39) 1.

REMARKS: Typical. Previously recorded from Port Jackson.

Genus **Trypanosyllis** Claparde, 1864

Trypanosyllis zebra (Grube, 1860)

Trypanosyllis taeniaeformis: Augener, 1931: 230.
Trypanosyllis taeniaeformis: Monro, 1936: 217, Fig. 19.
Trypanosyllis zebra: Day, 1967: 256, Fig. 12.6 a-b.

MATERIAL: Area 55 (148) 1.

REMARKS: The present specimen is a small immature one and it proved impossible to determine whether there was a subterminal dorsal tooth on the pharynx. In all other respects it agrees with specimens described as *T. zebra. T. taeniaeformis*, originally described by Haswell from Port Jackson, Australia, has either been regarded as a distinct species or synonymized with *T. zebra.* Imajima and Hartman (1964: 127) have redescribed *taeniaeformis,* placing it in the sub-genus *Trypanedenta* which is characterized by the absence of a sub-terminal mid dorsal tooth. The present specimen differs in having dorsal cirri with about 20 or 50 annulations, not 15 or 25. There appears to be some confusion over the status of *T. taeniaeformis* but this matter cannot be resolved until a representative collection of specimens from various geographic localities can be examined.

Family NEREIDAE Johnston, 1865

Genus **Ceratonereis** Kinberg, 1866

Ceratonereis costae (Grube, 1840)

? *Nereis (Ceratonereis) lapinigensis* Augener, 1913: 166-168.
Ceratonereis costae: Fauvel, 1923: 349, Figs. 136a-f.
Nereis (Ceratonereis) costae: Kott, 1951: 107, Figs. 5p-s, 6j-l.
Ceratonereis costae Day, 1967: 325, Fig. 14.10 h-l.

MATERIAL: Areas 7 (207) 1, (123) 1, 11 (21) 1, 28 (316) 1, 29 (107) 2, 69 (97) 1.

REMARKS: The present specimens agree with the description given by Day (1967) for *C. costae* from S. Africa. Kott (1951) has recorded this species previously from Rottnest Island, W. Aust.

Ceratonereis mirabilis Kinberg, 1866

Nereis mirabilis: Ehlers, 1887: 117, Pl. 37, figs. 1-6.
Nereis (Ceratonereis) mirabilis: Augener, 1913: 168.
Ceratonereis mirabilis: Hartman, 1954: 3.

MATERIAL: Areas 39 (43) 2, 63 (19) 1, 67 (217) 2.

REMARKS: Typical. This species is widely distributed from W. Aust. to the Great Barrier Reef, Qd.

Genus **Nereis** Linnaeus, 1758

Nereis cockburnensis Augener, 1913

Nereis cockburnensis Augener, 1913: 153, Figs. 15 a-c.
Nereis cockburnensis: Hartman, 1954: 33, Figs. 30-32.

MATERIAL: Area 57 (294) 1.

REMARKS: The specimen agrees with Hartman's (1954) description in the arrangement of the paragnaths on the proboscis, and in having two kinds of notopodial falcigers.

Nereis (Neanthes) caudata Delle Chiaje, 1841

Nereis arenaceodonta Moore, 1903: 720, Pl. 40, figs. 1-10.
Nereis (Neanthes) caudata: Fauvel, 1923: 347, Fig. 135a-e.
Neanthes cricognatha: Knox, 1951: 217, Pl. 45, figs. 6-8.
Nereis (Neanthes) arenaceodonta: Pettibone, 1963: 162 + 165, Figs. 44i, 45e.
Nereis (Neanthes) caudata Day, 1967: 321, Fig. 14.9 f-j.

MATERIAL: Area 59 (36) 1.

REMARKS: This species under the name *Nereis (Neanthes) cricognatha* has been recorded previously from S. Australia and W. Australia, and as *Nereis arenaceodonta* from Tasmania. The present specimen agrees with the description given by Day (1967) for *Nereis (Neanthes) caudata* from South Africa. Specimens from New Zealand, previously described as *Neanthes cricognatha* (Knox 1951) agree in every respect with those described by Pettibone (1963) as *Nereis (Neanthes) arenaceodonta* from eastern United States of America.

Genus **Perinereis** Kinberg, 1866

Perinereis amblyodonta (Kinberg, 1865)

Perienereis novae-hollandiae Kinberg, 1866: 175.
Perinereis amblyodonta: Hartman, 1954: 33.

MATERIAL: Areas 42 (38) 3, 5 (148) 2.

REMARKS: Typical. This species is widely distributed around temperate Australian shores.

Perinereis nuntia brevicirris (Grube, 1857)

Perinereis nuntia var. *brevicirris*: Knox, 1951: 218, Figs. 14-18.
Perinereis brevicirris: Hartman, 1955: 4, 10.

MATERIAL: Area 9 (84) 1.

REMARKS: Typical. This species is widely distributed around Australian shores.

Genus **Platynereis** Kinberg, 1866

Platynereis australis (Schmarda, 1861)

Platynereis magalhaensis Kinberg, 1866: 177.
Platynereis australis: Hartman, 1954: 36.

MATERIAL: Areas 5 (53) 1, 5 (169) 1, 9 (178) 2, 14 (175) 2, 31 (10) 1, 40 (101) 1, 42 (38) 5, 55 (148) 1, 59 (24) 1, (36) 1, 43 (20) 1, 68 (155) 3.

REMARKS: Typical. This widely distributed S. hemisphere cold water species has been recorded previously from Sellick beach, S. Aust., and the Great Australian Bight.

Eusyllis brevicirrata n.sp.
Fig. 11—Anterior end in dorsal view.
Fig. 12—Typical parapodium in posterior view.
Fig. 13—Distal end of a long-bladed compound seta.
Fig. 14—Distal end of a short-bladed compound seta.
Nephtys picta Ehlers, 1868
Fig. 15—5th parapodium.
Fig. 16—Median parapodium.
Hemipodus australiensis n.sp.
Fig. 17—Proboscis papillae.

Family NEPHTYIDAE Grube, 1850

Genus **Nephtys** Cuvier, 1817

Nephtys picta Ehlers, 1868

Figs. 15-16

Nephtys picta Ehlers, 1868: 632, 635; Pl. 25, figs. 9, 35.
Nephtys picta: Hartman, 1950: 103,105.

MATERIAL: Anglesea, Vict. (1).

REMARKS: Three species of the genus *Nephtys (N. gravieri, N. microcirrus, N. australiensis)* have been recorded from Australia. The present specimen differs from all these in many respects, especially in the size and shape of the branchiae (Figs. 15, 16). In almost all respects it agrees with the description given by Hartman (1950: 103) for *N. picta* which has been recorded previously only from the E. shores of N. America. However, as many species of this genus are known only from limited records, it is possible that its distribution is far more widely spread.

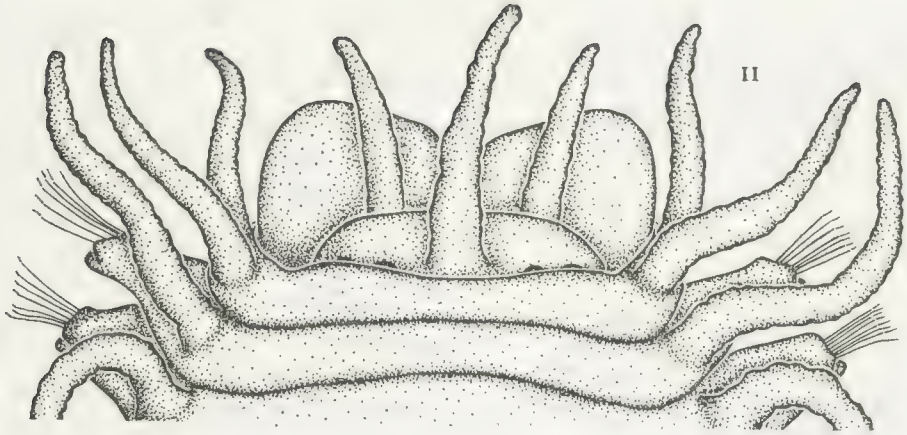
Family GLYCERIDAE Grube, 1850

Genus **Glycera** Savigny, 1818

Glycera americana Leidy, 1855

Glycera americana: Augener, 1922: 29.
Glycera americana: Knox, 1960: 221-223, Figs. 1-3.

MATERIAL: Areas 2 (201), 1, 11-13 (210-212) 2, 26 (300) 5, 28 (286) 1, 29 (317) 1, 42 (108) 1, 61 (242) 1, 63 (245) 1.



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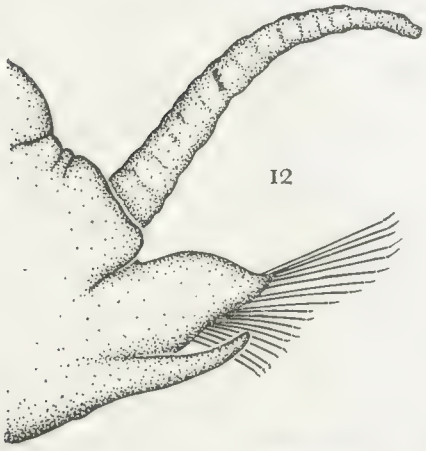

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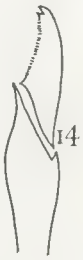

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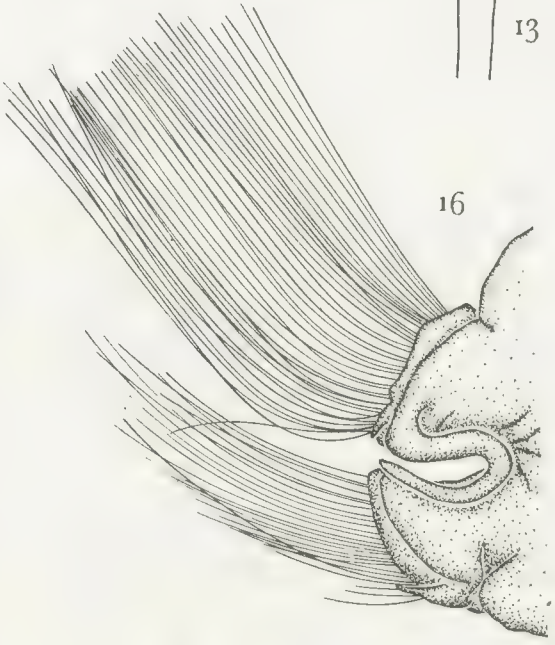

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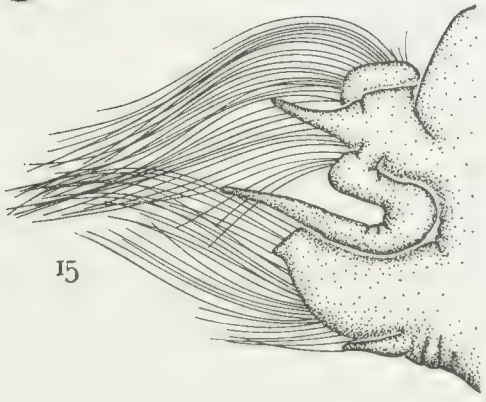

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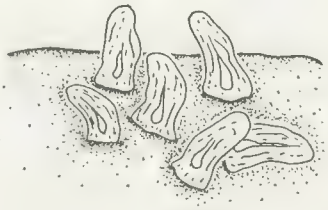

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REMARKS: Typical. Widespread on temperate Australian shores, having been recorded previously from Port Phillip Bay by Augener (1927).

Genus **Hemipodus** Quarefages, 1865

Hemipodus australiensis n.sp.

Figs. 17-19

MATERIAL: Beau Beach (2).

DESCRIPTION:

Size: Length 100 mm, width including parapodia 4 mm.

Colour in Alcohol: Light brown to cream.

Prostomium: Longer than broad, tapering to a fine point; no visible annulations; terminal antennae very small; no eyes visible.

Proboscis: 10-15 mm long when everted; covered with a single type of papillae, short squat, irregular cones (Fig. 17); four terminal jaws, each with a rod-like aileron attached at right angles to the axis of the jaw.

Segments: Biannulate with the parapodia on the posterior annulation.

Parapodia: Fig. 18. First four or five very small, reaching full size by segment 10; presetal lobe large, rounded, with a small globular extension reaching halfway along the length of the setae; a postsetal lamella slightly longer than the presetal lobe can be seen in anterior view. Dorsal and ventral cirri similar, small and globular, attached to the body wall near the base of the parapodia.

Setae: Fig. 19. All are homogomph spinigers, the end pieces with very fine lateral serrations.

HOLOTYPE G1746 and PARATYPE G1747: Nat. Mus. Vict. Coll.

TYPE LOCALITY: Beau Beach, Port Phillip.

REMARKS: Only one species of *Hemipodus* (*H. simplex*) has been recorded previously from Australia. The present specimens differ from *H. simplex* and all other described species in the shape of the parapodia, especially the presetal lobe and dorsal and ventral cirri, and in the single type of short squat irregular cone shaped papillae on the proboscis.

Family GONIADIDAE Kinberg, 1866

Genus **Goniada** Audouin and Milne Edwards 1833

Goniada emerita Audouin and Milne Edwards, 1833

Goniada emerita: Ehlers, 1868: 718, Pl. 24, figs. 49-51.
Goniada emerita: Fauvel, 1914: 211, Pl. 19, figs. 7-10.

MATERIAL: Area 42 (109) 1.

REMARKS: Typical. Previously recorded by Augener (1927) from Port Jackson, N.S.W., as *Goniada australiensis*.

Family EUNICIDAE Savigny, 1818

Subfamily EUNICINAE Savigny, 1818

Genus **Eunice** Cuvier, 1817

Eunice antennata (Savigny, 1820)

Eunice antennata: Crossland, 1904: 312, Pl. 22, figs. 1-7, Figs. 56-60.
Eunice antennata: Fauvel, 1953: 240, Figs. 118f-g.

MATERIAL: Area 58 (79) 1, 58 (91) 1, 59 (36) 1, 66 (292) 1

REMARKS: Typical. This species has been widely recorded from both tropical and temperate Australian shores.

Eunice australis Quatrefages, 1865

Eunice murrayi McIntosh, 1885: 288, Pl. 39, figs. 7-8; Pl. 20, figs. 19-20.
Eunice australis: Fauvel, 1917: 228, Figs. 21a-d.

MATERIAL: Areas 24 (122) 1, 51, (270) 2, 69 (222) 2.

REMARKS: This species has been widely reported from W. and S. Australian shores.

Eunice tentaculata Quatrefages, 1865

Eunice pycnobranchiata McIntosh, 1885: 294, Pl. 24, figs. 13-15.
Eunice tentaculata: Fauvel, 1917: 209, Fig. 18a-d.

MATERIAL: Areas 42 (109) 2, 57 (217) 1, 55 (148) 1, 59 (24) 1, (36) 4, 64 (164) 3.

REMARKS: Typical. This species is widely distributed around Australia especially on temperate shores.

Eunice (Palolo) siciliensis Grube, 1840

Eunice siciliensis: Fauvel, 1923: 405, Fig. 159e-m.
Eunice (Palolo) siciliensis: Day, 1967: 382, Fig. 17.2 a-f.

MATERIAL: Areas 5 (56) 1, 13 (92) 2, 17 (170-2) 1, 30 (130) 1, 31 (10) 1, 55 (148) 1, 59 (24) 2, (36) 4, 69 (222) 1.

REMARKS: Typical. This species is widely distributed around Australian shores.

Genus **Lysidice** Savigny, 1818

Lysdice ninetta Audouin and Milne Edwards, 1834

Lysidice ninetta Audouin and Milne Edwards, 1834: 161, Pl. 36, figs. 1-8.
Lysidice ninetta: Fauvel, 1917: 275, Figs. 23a-f, 24a-b.

MATERIAL: Areas 17 (170) 1, 55 (148) 1.

REMARKS: Previously recorded on temperate shores from W. Australia to N.S.W.

Hemipodus australiensis n.sp.
Fig. 18—Posterior parapodium in posterior view.
Fig. 19—Distal end of typical compound seta.
Diopatra acidulata n.sp.
Fig. 20—Anterior end in dorsal view (two prostomial tentacles removed).
Fig. 21—Median parapodium in posterior view.
Fig. 22—Pseudocompound hook from 3rd setiger.
Fig. 23—Comb setae from median parapodium.

Subfamily ONUPHINAE Kinberg, 1865

Genus **Diopatra** Audouin and Milne Edwards, 1833

Diopatra aciculata n.sp.

Figs. 20-25

MATERIAL: Area 2 (201) 1.

DESCRIPTION:

Size: Length of the incomplete specimen 48 mm; width including parapodia 5 mm; segments number 67.

Tube: Composed of successive layers of parchment-like material, white with patches of brown pigment; there is no sign of any attached shell fragments or sand grains.

Colour in Alcohol: Dorsum marked with transverse bands of brown pigment, more dense in the median region of the anterior segments; dorsal antennae and gills white; ventrum pale cream.

Prostomium: Fig. 20. With a pair of raised, eye-like prominences, each with a small eyespot. Frontal antennae cirriform, smooth, tapering to a fine point; occipital antennae smooth, long and slender, the median one about as long as the first 12 segments; ceratophores with up to 15 nearly equal rings plus a longer distal one.

Peristomium: About equal in length to the succeeding segments with a pair of widely spaced slender tentacular cirri.

Parapodia: Three anterior prebranchial parapodia larger than the following and directed forward with elongated dorsal cirri, and similar, though smaller, ventral cirri. In the succeeding parapodia the dorsal cirri are slender, elongated and extend beyond the tip of the gills; ventral cirri pad-like; post-setal lobe elongate, triangular. Gills commence on the third segment; they are closely spiralled with numerous brachial filament forming a bushy top (Fig. 21). They extend to about the 45th segment, gradually decreasing in size and number of whorls until they are reduced to a single filament.

Setae: First three setigers with pseudo-compound hooks (Fig. 22), distally bidentate, the secondary tooth forming a rounded knob; setiger four onwards with a dorsal bundle of capillary setae, median segments also with a small number of comb setae (Fig. 23) each with about seven stout teeth. Neuro-aciculae typically five per segment in the median region, dark brown in colour and tapering to a point which curves sharply upwards (Fig. 24). Subacicular hooks two in number, first present from segment 14, yellow in colour and distally bidentate (Fig. 25).

HOLOTYPE G1748: Nat. Mus. Vict. Coll.

TYPE LOCALITY: Area 2 (201).

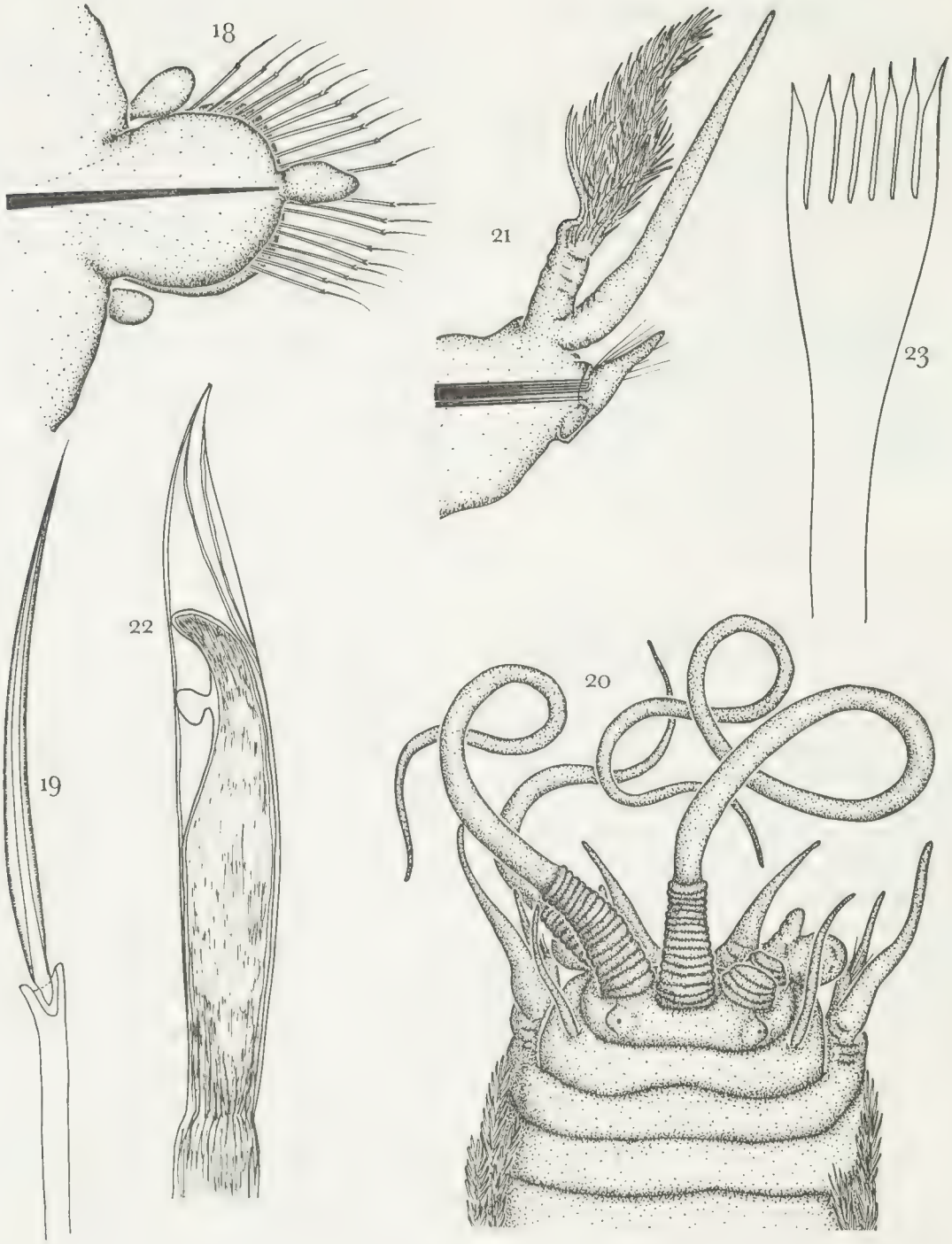
REMARKS: *D. aciculata* belong to the section of the genus with few teeth on the comb setae including such species as *D. neapolitana, D. variabilis, D. dentata* and *D. splendidissima*. It differs from those previously described in the pseudo-compound setae with their knob-like secondary tooth and elongate pointed guard, and in the neuroaciculae with their sharply upwardly curved distal ends. Other combinations of characters also serve to separate it, such as the smooth tube, the widely spaced tentacular cirri, and the elongate dorsal cirri projecting beyond the tip of the gills.

Genus **Onuphis** Audouin and Milne Edwards, 1883

Onuphis (Nothria) holobranchiata Marenzeller, 1879

Onuphis (Nothria) holobranchiata Marenzeller, 1879: 132.
Onuphis (Nothria) holobranchiata: Day, 1967: 424, Fig. 17.13f-g.

MATERIAL: Area 42 (289) 1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REMARKS: The present specimen agrees with the description of *O.* (*N.*) *holobranchiata* given by Day (1967) for specimens from SW. Africa. This is the first record from Australian shores.

Subfamily LYSARETINAE Kinberg, 1865

Genus **Oenone** Savigny, 1820

Oenone fulgida (Savigny, 1818)

Oenone diphyllidia Ehlers, 1887: 190, Pl. 34, figs. 1-7.
Oenone fulgida: Augener, 1913: 290.

MATERIAL: Area 69 (221) 1.

REMARKS: This species has been recorded previously from Cape York, Qd., to W. Aust.

Subfamily LUMBRINERINAE Malmgrem, 1867

Genus **Lumbrineris** Blainville, 1828

Lumbrineris latreilli Audouin and Milne Edwards, 1834

Lumbrineris latreilli Audouin and Milne Edwards, 1834: 168.
Lumbriconereis latreilli: Fauvel, 1923: 431, Fig. 171m-r.

MATERIAL: Areas 14 (175) 1, 28 (286) 1, 42 (665) 1, 59 (24) 1, (36) 1

REMARKS: The present specimens agree in all respects with the description given by Fauvel (1923: 431). There are winged capillaries in the anterior parapodia, long bladed compound hooks are present in the anterior feet, being gradually replaced by simple hooks with a characteristically club shaped appearance. The aciculae are yellow.

This is the first record of this cosmopolitan species from Australia.

Subfamily ARABELLINAE Hartman, 1944

Genus **Arabella** Grube, 1950

Arabella iricolor iricolor (Montagu, 1804)

Arabella multidentata Ehlers, 1887: 112, Pl. 34, figs. 8-10; Pl. 35, figs. 1-4.
Arabella iricolor: Augener, 1927: 191.
Arabella iricolor iricolor: Day, 1967: 446, Fig. 17.18i-m.

MATERIAL: Areas 9 (178) 1, 11 (190) 1,

REMARKS: This species has been recorded previously from W.A. and N.S.W.

Subfamily DORVILLEINAE Chamberlain, 1919

Genus **Dorvillea** Parfitt, 1866

Dorvillea australiensis (McIntosh, 1885)

Staurocephalus australiensis McIntosh, 1885: 232, Pl. 32, fig. 6; Pl. 17a, figs. 9-10.
Dorvillea australiensis: Augener, 1913: 296.

MATERIAL: Area 59 (24) 1.

REMARKS: This species is widely distributed on temperate shores of Australia.

Family CIRRATULIDAE Carus, 1863

Genus **Cirriformia** Hartman, 1939

Cirriformia filigera (Delle Chiaje, 1825)

Cirratulus australis Whitelegge, 1889: 210.
Cirriformia filigera: Day, 1967: 518, Fig. 20.4p-q.

MATERIAL: Areas 5 (169) 3, 6 (65) 3, 7 (204) 1, 11 (190) 2, 14 (8) 1, 25 (128) 1, 27 (138) 1, 31 (276) 1, 42 (289) 1, 61 (37) 1.

REMARKS: This species has been recorded previously only from N.S.W.

Cirriformia tentaculata (Montagu, 1808)

Audouinia tentaculata: Fauvel, 1927: 91, Fig. 32a-g.
Cirriformia tentaculata: Day, 1967: 515, Fig. 20.4a-d.

MATERIAL: Areas 6 (200) 2, 7 (207) 1, 9 (178) 7, 13 (92) 1, 25 (129) 3, (128) 1, 27 (138) 38 (311) 7, 37 (40) 1, (296) 1, 42 (109), 1, 49 (236-8) 4, 51 (270) 6, 53 (256) 3, 67 (216), 4.

REMARKS: This species is widely distributed on temperate Australian shores.

Family CHAETOPTERIDAE Malmgren, 1867

Genus **Chaetopterus** Cuvier, 1827

Chaetopterus variopedatus (Renier, 1904)

Chaetopterus lutrens Whitelegge, 1889: 201.
Chaetopterous variopedatus: Imajima and Hartman, 1964: 291-292.

MATERIAL: Areas 11-13 (209-12), 19 (306) 1, 20 (309) 2, 31 (276) 1, 43 (263) 2, 47 (259) 1, 49 (237) 2, 53 (253) 1, 55 (256) 1, 61 (242) 1, 62 (244) 2, 63 (246) 2.

REMARKS: This species has been recorded previously only from W. Aust. and N.S.W., but is probably much more widespread.

Family ORBINIIDAE Hartman, 1942

Genus **Haploscoloplos** Monro, 1933

Haploscoloplos kerguelensis (McIntosh, 1885)

Scoloplos kerguelensis McIntosh, 1885: 355, Pl. 43, figs. 6-8; Pl. 22a, fig. 19.
Haploscoloplos kerguelensis: Monro, 1936: 160.

MATERIAL: Areas 16 (283) 1, 24 (122) 1, 25 (128) 6, 27 (139) 1, 28 (286) 1, 61 (242) 2.

REMARKS: This species has been recorded only from W. Aust. but is probably widespread on temperate Australian shores.

Family OPHELIIDAE Malmgren, 1867
Genus **Armandia** Filippi, 1861
Armandia lanceolata Willey, 1905

Armandia lanceolata: Fauvel, 1932: 189.
Armandia lanceolata: Augener, 1914: 33.

MATERIAL: Areas 39 (314) 1, 49 (236) 3.

REMARKS: This species has been recorded previously from Western Port, Vict. to W. Aust.

Diopatra aciculata n.sp.
Fig. 24—Distal end of 3 typical aciculae.
Fig. 25—Distal end of a subacicular hook from a median parapodium.
Asychis glabra n.sp.
Fig. 26—Anterior end in right lateral view.
Fig. 27—Cephalic plaque and first setiger in dorsal view.
Fig. 28—Anal plaque in dorsal view.
Fig. 29—Hook from 2nd setiger.

Family MALDANIDAE Malmgren, 1867
Genus **Asychis** Kinberg, 1861
Asychis glabra n.sp.
Figs. 26-29

MATERIAL: Areas 16 (283) 1, 19 (306) 1, 25 (128) 1, 26, (126) 1, 28 (286) 2, 31 (276) 1, 37 (40) 2, 42 (109) 10.

DESCRIPTION:

Size: Length up to 90 mm, width 3 mm.

Colour in Alcohol: Pale yellow to white.

Prostomium: Broad and flattened from above, tapering to a blunt point anteriorly; with a pair of prominent nuchal grooves; eyespots absent (Fig. 27). Cephalic plaque broadly oval without obvious keel but with the centre arched in convex manner in lateral view (Fig. 26). Cephalic rim deep, forming a sheath or hood over the posterior quarter of the cephalic plate; the rim deeply incised laterally.

Segments: First segment with a collar on its anterior margin. (Fig. 26). The body consists of 19 setigerous segments behind the asetigerous peristomial segment, and one or possibly two poorly marked asetigerous preanal segments. The first seven or eight segments increase in length; the median segments equal in length, and becoming shorter again after the 15th.

Pygidium: Fig. 28. Anal plaque forming about a 45 degree angle to the rest of the body, its raised margins deeply incised laterally but otherwise entire.

Setae: Simple winged capillaries, uncini with narrow necks and consisting of one main fang with three or four rows of small teeth on the hind margin (Fig. 29).

HOLOTYPE G1749 and 18 PARATYPES G1750-6: Nat. Mus. Vict. Coll.

TYPE LOCALITY: Area 16 (283).

REMARKS: There is only one species of this genus previously recorded from Australia, *A. victoriae* from 1,100 fm, S. of Cape Nelson, Vict. (Benham 1916). Benham's species, however, lacked a posterior end and differs from the present specimens in the arrangement of the setae and in other minor details. The present specimens show certain affinities with *A. capensis* Day, 1961; this latter species, however, has an anal plaque which is at right angles to the body and notched ventrally to form a series of about nine scallops.

Family PECTINARIIDAE Quatrefages, 1865
Genus **Pectinaria** Savigny, 1818
Pectinaria antipoda Schmarda, 1861

Pectinaria antipoda: Pruvot, 1930: 78, Pl. 3, figs. 93-95.
Pectinaria antipoda: Fauvel, 1932: 214.

MATERIAL: Areas 13 (192) 2, 36 (75-77) 2, 55 (256) 2; Nat. Mus. Vict. Coll. Albany, W. Aust., clean sand flat, intertidal (1).

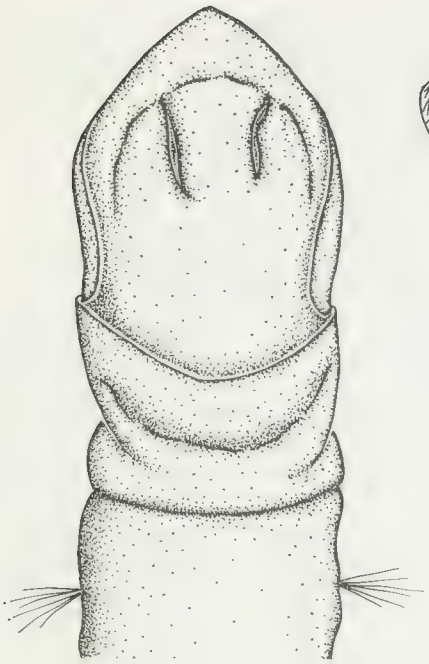
REMARKS: This species has been recorded previously from Great Barrier Reef, Qd., and N.S.W.

Family TEREBELLIDAE Grube, 1851
Subfamily TRICHOBRANCHINAE Malmgren, 1866
Genus **Terebellides** Sars, 1835
Terebellides stroemi Sars, 1835

Terebellides stroemi: Augener, 1927: 258.
Terebellides stroemi: Fauvel, 1927: 291, Fig. 100i-q.

MATERIAL: Areas 25 (128) 1, 38 (311) 2, 27 (302) 1, 28 (285) 1, (286) 8, 31 (10) 1, 39 (312) 18, (48) 4, 43 (274) 12, 53 (253) 6.

REMARKS: This cosmopolitan species has been recorded previously from Western Port and Port Phillip, and is probably widespread around Australian shores.



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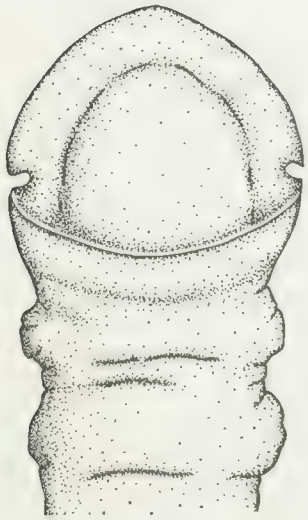

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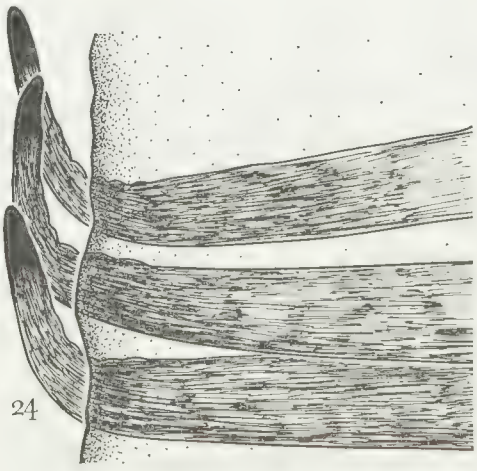

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Subfamily POLYCIRRINAE Malmgren, 1865
Genus **Polycirrus** Grube, 1850
Polycirrus porcata n.sp.
Figs. 30-31.

MATERIAL: Area 14 (175) 1.

DESCRIPTION:

Size: Length of body 45 mm excluding the prostomial tentacles; segments number about 45.

Colour in Alcohol: Pale yellow to white.

Head: Tentacular lobe somewhat rectangular in shape with two types of tentacles, numerous short fine tentacles ventrally and numerous larger and elongated tentacles dorsally. There are prominent rounded lateral lobes on the buccal segment.

Thorax: There are twelve segments bearing notosetae with the uncini beginning on the eighth of these segments. Thoracic parapodia are borne on prominent ventro-lateral ridges separated by a deep median groove (Fig. 30); there are nine pairs of prominent elongated nephridial papillae.

Abdomen: Comprises about 30 segments; inflated posteriorly, tapering to a fine point; the uncinigerous pinnules are borne ventrally on a pair of ridges which are a continuation of the thoracic ridges but reduced in size.

Setae: Thoracic notosetae are finely serrated winged capillaries. Thoracic uncini have a broad base and six or seven secondary teeth above the main fang (Fig. 31); abdominal uncini similar but with slightly fewer secondary teeth.

HOLOTYPE G1757: Nat. Mus. Vict. Coll.

TYPE LOCALITY: Area 14 (175).

REMARKS: Only one species of this genus, *P. boholensis* has been recorded previously from Australia. It differs from the present species in a number of respects including the shape of the uncini; Augener (1914) figures uncini with a single apical tooth. The present species is distinguished by the absence of glandular swellings and their replacement by two smooth longitudinal ridges with a deep groove in between. Another unique feaure is the presence of nine pairs of prominent nephridial papillae.

Subfamily THELEPINAE, Malmgren, 1886.
Genus **Thelepus** Leuckart, 1849
Thelepus setosus (Quatrefages, 1865)

Thelepus throcicus Augener, 1914: 99.
Thelepus setosus: Fauvel, 1916: 268, Figs. 3-4.

MATERIAL: Areas 14 (175) 1, 31 (10) 1, 42 (38) 1.

REMARKS: This species has previously been recorded from W. and S. Aust.

Subfamily TEREBELLINAE Grube, 1850
Genus **Amphitrite** Muller, 1771
Amphitrite rubra (Risso, 1828)

Amphitrite rubra: Fauvel, 1917: 265, Fig. 27a-f.
Amphitrite rubra: Fauvel, 1927: 249-250, Fig. 85h-l.

MATERIAL: Areas 5 (53) 20, 5 (169) 1, 6 (118) 5, 7 (207) 1, (123) 2, 10 (13-14) 3, 11-13 (210-2) 3, 11 (212) 2, 13 (93) 7, (94) 1, 14 (8) 2, 16 (142) 1, 17 (170) 1, 19 (306), 2, 25 (128) 1, 26 (126) 3, 27 (138) 4, (284) 1, 28 (286) 13, 29 (107) 14, 31 (10) 5, 33 (177) 1, 35 (72), 36 (75, 77) 9, 38 (127) 8, 42 (265) 1, (281) 3, 49 (236-8) 6, 55 (144) 1, 59 (24) 12, (36) (65) 61, (37) 3, 63 (21) 9, 64 (163) 1.

REMARKS: This cosmopolitan species was easily the most comon terebellid in the collections. It has been reported previously from N.S.W., S. Aust. and Vict. coasts.

Polycirrus porcata n.sp.
Fig. 30—Anterior end in ventral view.
Fig. 31—Thoracic uncinus.
Artacamella dibranchiata n.sp.
Fig. 32—Anterior end in left lateral view.
Fig. 33—Thoracic notoseta.
Fig. 34—Thoracic uncinus.
Fig. 35—Abdominal uncinus.

Genus **Artacamella** Hartman, 1955
Artacamella dibranchiata n.sp.
Figs 32-35

MATERIAL: Area 61 (242) 2.

DESCRIPTION:

Size: Length of body 10 mm excluding tentacles; width 3 mm; segments number over 50 of which 15 are thoracic.

Colour in Alcohol: Pale yellow.

Prostomium: Fig. 32. An inconspicuous lobe with a mass of fine bushy tentacles, including a few longer, elongated, longitudinally grooved ones, arising from the dorsal surface.


30
33
34
35
31
32

Peristomium: Prolonged forward ventrally to form the characteristic proboscis, the surface of which is folded into an irregular series of grooves (Fig. 32); no peristomial eyes are visible.

Branchiae: Two pairs, inserted on segments one and two; both pairs are wrinkled in appearance and taper gently to blunt tips, the first pair being nearly twice the length of the second.

Setae: Uncini and notosetae both begin on segment five; thoracic notosetae (Fig. 33) are simple capillaries; thoracic uncini are long handled with one main fang and two or three small insignificant teeth (Fig. 34); abdominal uncini similar but with seven or eight more conspicuous secondary teeth (Fig. 35).

HOLOTYPE G1758 and ONE PARATYPE G1759: Nat. Mus. Vict. Coll.

TYPE LOCALITY: Area 61 (242).

REMARKS: This genus was erected by Hartman (1955) for a single species *A. hancocki*. No other members of the genus have subsequently been reported. The present specimens agree with the generic definition except that there are two pairs of branchiae instead of three. The generic definition would therefore have to be amended to allow for two or three pairs of branchiae. Other differences include the absence of both prostomial eyes and the pronounced longitudinal ridges of the proboscis-like organ.

Genus **Axionice** Malmgren, 1866

Axionice harrissoni (Benham, 1916)

Scione harrissoni Benham, 1916: 146-148, Pl. 47 fig. 26-31.

MATERIAL: Areas 56 (295) 1, 57 (294) 1.

REMARKS: The present specimens agree in all respects with the specimens described by Benham (1916) as *Scione harrissoni* except that there are eyespots present which apparently were absent on Benham's type specimen. There are characteristic lateral folds on three anterior segments, a single pair of aborescent gills with a pair of conical processes on the segment anterior to the gill bearing segment; there are 15 thoracic segments with notopodial setae.

Augener (1922) suggested that *Scione harrissoni* might be the same species as *Nicolea cetrata*, however, the latter species has two pairs of gills and differs in other characters. It appears that a single pair of gills is a character of the species and that a second anterior pair are not missing as Augener suspected.

Genus **Eupolymnia** Verrill, 1900

Eupolymnia nebulosa (Montagu, 1818)

Polymnia nebulosa: Fauvel, 1917: 267, Fig. 28a-n.
Eupolymnia nebulosa: Day, 1967: 744, Fig. 36, 9f-h.

MATERIAL: Areas 5 (169) 5, 6 (118) 21, (208) 5, 9 (178) 6, 10 (13-15) 3, 11 (212) 1, 13 (95) 1, 16 (142) 6, 17 (170-171) 5, 18 (307) 11, 19 (306) 1, 24 (122) 1, 26 (126) 2, 27 (139) 1, 31 (131) 2, 49 (236) 10, 59 (24) 1, 59 (213) 2, 61 (240) 1, 67 (217) 11.

REMARKS: This species is widely spread around Australian coasts.

Genus **Lanice** Malmgren, 1886

Lanice conchilega (Pallas, 1766)

Lanice conchilega: Fauvel, 1927: 255, Fig. 88a-h.
Lanice conchilega: Day, 1967: 743-744, Fig. 36, 8n-r.

MATERIAL: Areas 59 (36) numerous.

REMARKS: This species has been recorded previously only off the coast of Victoria.

Genus **Pista** Malmgren, 1866

Pista typha (Grube, 1878)

Pista typha: Augener, 1927: 254, Fig. 17a-b.
Pista typha: Monro, 1931: 30, Fig. 15a-c.

MATERIAL: Area 28 (286) 1.

REMARKS: Previously recorded from Low Isles, Great Barrier Reef, Qd., and Eden, N.S.W.

Family SABELLIDAE Malmgren, 1867

Subfamily SABELLINAE Rioja, 1923

Genus **Branchiomma** Kolliker, 1858

Branchiomma cingulata (Grube, 1870)

Dasychone cingulata: Augener, 1914, p. 213.
Branchiomma cingulata: Imajima and Hartman, 1964: 355.

MATERIAL: Areas 7 (123) 1, 9 (178) numerous, 11 (190) 3, 11 (212) tubes only, 19 (306) 2, 20 (124) 2, 31 (10) 3, 52 (252) 2, 53 (253) 2, 66 (292) 1.

REMARKS: Previously reported from W. Aust. and N.S.W.

Genus **Sabellastarte** Kröyer, 1856

Sabellastarte indica (Savigny, 1826)

Sabellastarte indica: Augener, 1914: 115, Pl. 1, fig. 20.
Sabellastarte indica: Fauvel, 1953: 445, Fig. 235a-h.

MATERIAL: Areas 58 (80) 1, 58 (89) 1, 59 (24) 13, 67 (217) numerous.

REMARKS: This large species of sabellid is widely distributed in the Indo-Pacific and tropical Atlantic Ocean. It has been widely reported from N. Aust. to Bass Strait.

Sabellastarte longa (Kinberg, 1867)

Sabellastarte longa: Johannson, 1925: 10, Figs. 3, 5-7.
Sabellastarte longa: Day, 1967: 771, Fig. 37.5a-e.

MATERIAL: Areas 10 (103) 1, 18 (307-8) 1, 104 (103) 1.

REMARKS: This species has been recorded previously from Madagascar and S. Africa. It differs from *S. indica* in having a double row of eyespots on the outer whorl of radioles. The present specimens agree with the description given by Day (1967) for specimens from S. African shores.

Subfamily FABRICIINAE Rioja, 1923

Genus **Myxicola** Koch (in) Renier, 1847

Myxicola infundibulum (Renier, 1804)

Myxicola infundibulum: Fauvel, 1927: 342, Figs. 119a-i.
Myxicola infundibulum: Day, 1967: 773, Fig. 375j-o.

MATERIAL: Areas 11-13 (210-2) 1, 24 (122) 1, 31 (131) 2, 32 (272) 1, 39 (43) 4, 43 (28) 1, 44 (262) 4, 52 (252) 1, 53 (253) 1, (256) tube only, 62 (244) 1, 64 (163) 1, 67 (217) 1, 68 (156) 1.

REMARKS: This is the first record of this cosmopolitan species from Australia. Present specimens agree with the description given by Day (1967).

Family SERPULIDAE Savigny, 1818

Subfamily SPIRORBINAE Chamberlin, 1919

Genus **Spirorbis** Daudin, 1800

Spirorbis (Paralaeospira) antarcticus Pixell, 1913

Spirorbis antarcticus Pixell, 1913: 351, Fig. 3.
Paralaeospira antarctica: Hartman, 1966: 138, Pl. 46, figs. 10-12.

MATERIAL: Area 31 (10) numerous.

REMARKS: The specimens agree in all respects with the description given by Pixell (1913) for *S. antarcticus*. The tubes are coiled clockwise when viewed from above, the coil forming a concave dish dorsally; in cross-section the tubes have the characteristic triangular shape with the edges of the triangle prolonged forward at the mouth to form three large teeth in most specimens. The operculum is slightly convex with a variable number of small spines arising from it; collar setae have simple short curved blades with very fine lateral teeth down one side; eight finely branched radioles are present.

S. (P.) antarcticus differs from the unidentified species below in a number of respects including the shape and ornamentation of the operculum, the shape and size of the collar setae, and in lacking the 5-8 longitudinal ridges on the tube.

Spirorbis (Paralaeospira) sp.

MATERIAL: Area 66 (292) numerous.

REMARKS: Tubes coiled clockwise when seen from above (sinistral); dense chalky white with a variable number (5-8) of prominent longitudinal ridges produced into a series of prominent teeth around the aperture. Operculum oval with a concave surface; there are no spines or prominences of any kind. Seven branched radioles; collar separate dorsally. The tubes are growing attached to algae or bryozoans.

Seven species of *Spirorbis* have been recorded from Australia, some being of doubtful status. The present specimens do not appear to agree with any of the described species but specific determination of these specimens is not possible without a complete revision, based on adequate material, of the Australian representatives of the genus.

Subfamily SERPULINAE MacLeay, 1840

Genus **Pomatoceros** Philippi, 1844

Pomatoceros terraenovae Benham, 1927

Pomatoceros terranovae Benham, 1927: 151, Pl. 5, figs. 174-180.
Pomatoceros terraenovae: Dew, 1959: 39, Fig. 13.

MATERIAL: Area 31 (131) 1.

REMARKS: A single specimen which agrees with the descriptions given for the species except that the violet stripes along the tube are not present. The specimen, however, is a juvenile and these may develop later in life or be lost in preservation.

Genus **Salmacina** Claparede, 1870

Salmacina dysteri (Huxley, 1855)

Salmacina dysteri: Dew, 1959; 50, Fig. 19.
Salmacina dysteri: Pillai, 1960: 3, Figs. A-H.

MATERIAL: Area 58, Pt. Lonsdale (numerous).

REMARKS: This cosmopolitan species has been widely reported around Australian shores.

Genus **Serpula** Linnaeus, 1758

Serpula sp.

MATERIAL: Area 26 (300) fragments.

REMARKS: A number of fragmented tubes, circular in cross-section; colour whitish with flecks of brown. Most of the tubes are empty apart from two fragments of the abdominal region. From the material it is impossible to be certain even of genus, but they probably belong to a species of *Serpula*.

Genus **Temporaria** Straughen, 1967

Temporaria polytrema (Philippi, 1884)

Pomatostegus polytrema: Saint-Joseph, 1906: 252, Pl. 5, figs. 118-9.
Pomatostegus polytremea: Fauvel, 1927: 369, Figs. 127-ul.

MATERIAL: Area 27 (284) tube only.

REMARKS: An empty tube only, with the characteristic flattened triangular shape, dorsal keel, and rows of pores along the side.

Genus **Vermiliopsis** Saint-Joseph, 1894

Vermiliopsis acanthophora Augener, 1914

Vermiliopsis acanthophora Augener, 1914: 155, Pl. 11, figs. 21-24.
Vermiliopsis acanthophora: Dew, 1959: 33, Fig. 9.

MATERIAL: Areas 13 (175) tube only, 14 (95), 59 (24) 1.

REMARKS: The present specimen from Picnic Point resembles that figured by Fauvel (1953), in that there are two horny rings on the operculum, whereas that figured by Dew (1959) shows six tiers of horny rings.

Vermiliopsis infundibulum Linnaeus, 1788

Vermiliopsis infundibulum: Fauvel, 1927: 362-363, Fig. 124a-g.
Vermiliopsis infundibulum: Straughen, 1967a: 233.

MATERIAL: Area 55 (148) 1.

REMARKS: The present specimen has the characteristic chitinous conical operculum with a toothed cap and the succession of peristomes on the tube. This is the first record of the species from Victoria, it having been recorded previously from Qd. and N.S.W.

References

AUDOUIN, J. V., and MILNE EDWARDS, H., 1834. *Recherches pour servir a l'histoire naturelle du littoral de la France*. Paris, 290 pp.

AUGENER, H., 1913. Polychaeta Errantia *in* Michaelsen, W. and Hartmeyer, R. eds. *Die Fauna Sudwest-Australiens*. Jena 4: 65-304.

————, 1914. Polychaeta Sedentaria *in* Michaelsen, W. and Hartmeyer, R. eds. *Die Fauna Sudwest-Australiens* Jena 5: 1-170.

————, 1922. Revision der Australischen Polychaeten von Kinberg. *Ark. Zool.* 14: 1-42.

————, 1927. Polychaeten von Südost-und Süd-Australien. *Videns. Medd. Kjobenhavn* 83: 71-275.

BENHAM, W. B., 1915-1916. Report on the Polychaeta obtained by the F.I.S. "Endeavour" on the coasts of New South Wales, Victoria, Tasmania and South Australia. 1: 173-237, 2: 127-162. Sydney. *Biological Results of the Fishing Experiments carried on by the F.I.S. "Endeavour" 1909-1914*.

BENNETT, I., and POPE, E. C., 1960. Intertidal zonation of the exposed rocky shores of Tasmania and its relationship to the rest of Australia. *Aust. J. mar. Freshw. J. Res.* 11: 182-221.

CROSSLAND, C., 1904. On the marine fauna of Zanzibar and British East Africa from collections made by Cyril Crossland in the years 1901 and 1902. Polychaeta, Pt. 3. *Proc. zool. Soc. Lond. 1904*. 287-330.

DAY, J. H., 1961. The Polychaete Fauna of South Africa, Pt. 6. Sedentary species dredged off cape coasts with a few new records from the shore. *J. Linn. Soc. Zool.* 44: 463-560.

————, 1967. *A Monograph on the Polychaeta of Southern Africa*. Pts. 1-2, 878 pp. Trustees British Museum (Natural History).

DEW, B., 1959. Serpulidae (Polychaeta) from Australia. *Rec. Aust. Mus.* 25(2): 19-56.

EHLERS, E., 1887. Report on the annelids of the dredging expedition of the U.S. coast survey steamer "Blake". *Mem. Mus. comp. Zool. Harv.* 15: 1-335.

FAUVEL, P., 1914. Annelides polychetes de San Thome (Golfe de Guinée) recueillies par M. Ch. Gravier. *Arch. Zool. exp. gen.* 54: 105-155.

————, 1916. Annelides polychetes des Iles Falkland recueillies par M. Rupert Vallentin Esqre. (1908-1910). *Arch Zool. exp. gen.* 55: 417-482.

————, 1917. Annelides Polychetes de l'Australie meridionale. *Arch. Zool. Paris* 56: 159-278.

————, 1923. Polychetes Errantes. *Faune Fr.* 5: 1-488.

————, 1927. Polychetes Sedentaires. Addenda aux Errantes, Archiannelida, Myzostomaires. *Faune Fr.* 16: 1-494.

————, 1932. Annelida Polychaeta of the Indian Museum, Calcutta. *Mem. Indian Mus.* 12: 1-262.

————, 1953. Annelida Polychaeta. *In* Seymour-Sewell, R. B. ed. *The Fauna of India, including Pakistan, Ceylon, Burma and Malaya*. Allahabad, 507 pp.

GRAVIER, C., 1901. Contribution à l'etude des annelides polychetes de la Mer Rouge. *Nouv. Archs. Mus. Hist. nat., Paris*, Ser. 4(3): 147-268.

HARTMAN, O., 1950. Polychaeta: Goniadidae, Glyceridae and Nephtyidae. *Allan Hancock Pacific Expeditions 15 (1)*. 180 pp.

————, 1953. Australian nereidae. *Trans. roy. Soc. S. Aust.* 77: 1-41.

————, 1954. Marine annelids from the northern Marshall Islands. *Prof. Pap. U.S. geol. Surv.* 260-Q: 619-644.

————, 1955. Endemism in the North Pacific Ocean, with emphasis on the distribution of marine annelids and descriptions of new or little known species. Pp. 39-60 in *Essays in the Natural Sciences in honour of Capt. Allan Hancock*. Los Angeles.

————, 1966. Polychaeta Myzostomidae and Sedentaria of Antarctica. *Antarctic Res. Ser. 7*, 143 pp., American Geophysical Union, Washington.

HASWELL, W. A., 1886. Observations on some Australian Polychaeta, Pt. 1. *Proc. Linn. Soc. N.S.W.* 10(4): 733-756.

————, 1920. Australian Syllidae, Eusyllidae and Autolytidae. *Proc. Linn. Soc. N.S.W.* 14(1): 90-111.

IMAJIMA, M., and HARTMAN, O., 1964. The Polychaetous annelids of Japan, Pts. 1-2. *Occ. Pap. Allan Hancock Fdn* 26: 1-237, 238-452.

JOHANSSON, K. E., 1925. Bemerkungen über Kinsbergschen Arten der Familien Hermellidae und Sabellidae. *Ark. Zool.* 18A(7): 1-28.

KINBERG, J. G. H., 1857-1910. *Konglia Svenska Fregatten Eugenies Resa Omkring jorden unter bëfal of C.A. Virgen aren 1851-1853. Zoolog. 3 Annulater*, 78 pp. Uppsala.

————, 1866. Annulata nova. *Ofvers. K. Vetensk. Acad. Förh.* 22: 167-169, 239-258.

KNOX, G. A., 1951. The Polychaetous annelids of Banks Peninsula Pt. 1. Nereidae. *Rec. Canterbury Mus.* 5(5): 213-229.

————, 1960. The Polychaeta Errantia of the Chatham Islands 1954 Expedition. *Bull N.Z. Dep, Scient. ind. Res.* 139: 77-140.

————, 1963. The biogeography and intertidal ecology of the Australasian coasts. *Oceanogr. mar. Biol. Ann. Rev.* 1: 341-404.

KOTT, P., 1951. Nereidae and Eunicidae of South Western Australia; also notes on the ecology of Western Australian limestone reefs. *J. Proc. R. Soc. W. Aust.* 35: 85-130.

MARENZELLER, E. Von., 1879. Sudjapanische Anneliden 1. *Denskchr. Acad. Wiss., Wien* 41(2): 109-152.

MCINTOSH, W. C., 1885. Report on the Annelida Polychaeta collected by H.M.S. *Challenger* during the years 1873-76. *Rep. scient. Results Challenger Z(ool).* 12: 1-554.

MONRO, C. C. A., 1924. On the Polychaeta collected by H.M.S. *Alert* 1881-1882. Families Polynoidae, Sigalionidae and Eunicidae. *J. Linn. Soc. Zool.* 36: 37-74.

————, 1931. On a collection of Polychaetes in the Raffles Museum Singapore. *Bull. Raffles Mus.* 5: 33-46.

————, 1936. Polychaete Worms 2. *"Discovery" Rep.* 12: 59-198.

MOORE, J. P., 1903. Descriptions of two new species of Polychaete from Woods Hole, Mass. *Proc. Acad. nat. Sci. Philad.* 55: 720-726.

PETTIBONE, M. H., 1963. Marine Polychaete worms of the New England region. 1. Aphroditadae through Trochochaetidae. *Bull. U.S. natn. Mus.* 227(1): 1-346.

PILLAI, T. G., 1960. Some marine and brackish-water Serpulid Polychaeta from Ceylon including new genera and species. *Ceylon J. Sci. biol. Sci.* 3(1): 1-40.

PIXELL, H. L. M., 1913. Polychaeta of the Families Serpulidae and Sabellidae collected by the Scottish National Antarctic Expedition. *Trans. roy. Soc. Edinb.* 49(2): 347-358.

PRUVOT, G., 1930. Annelides Polychetes de Nouvelle Caledonia. *Archs Zool. exp. gén.* 70: 1-94.

SAINT-JOSEPH, Baron A., 1906. Les Annelides Polychetes des côtes de France (Océan et Côtes de Provence). *Annls Sci nat.* 9(3): 145-260.

SCHMARDA, L. K., 1861. Neue wirbellose Thiere beobachtet und gesammelt auf einer Reise um die Erde 1853 bis 1857, 1. *Turbellarien Rotatorien und Anneliden*. Leipzig, 164 pp.

STRAUGHEN, D., 1967. Some Serpulidae (Annelida: Polychaeta) from Heron Island, Queensland. *Publs Univ. Qd, Gt. Barrier Reef Comm. Heron Is. Res. Stat.* 1(2): 27-45.

WHITELEGGE, T., 1889. Report on the worm disease affecting oysters on the coast of New South Wales. *Rec. Aust. Mus.* 1: 45-53.

5

BRACHYURA (CRUSTACEA, DECAPODA)

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Abstract

The Survey collected 1023 specimens of Brachyura belonging to 29 species and 10 families. Seven species were taken by the Portland Pier Survey in 1963, five of which are also represented in the Port Phillip Survey collection. Only four of the 38 species known from Western Port are represented in the collection. The majid *Paratymolus latipes* and the xanthid *Pilumnus acer* are recorded from Victoria for the first time; previous records of the graspid *Cyclograpsus audouinii* from Victoria are doubtful. Seventeen species known from Port Phillip are not represented in the collection. All are typically cool temperate species well known from SE. Australia. Four species of *Pilumnus* were represented in the collections and these are compared in detail with other SE. Australian *Pilumnus* species. Most abundant in Port Phillip are *Halicarcinus ovatus* and *H. rostratus* (Hymenosomatidae), *Notomithrax minor* (Majidae), *Ebalia* (*Phylyxia*) *intermedia* (Leucosiidae), *Litocheira bispinosa* (Goneplacidae), *Pilumnus tomentosus* and *P. monilifer* (Xanthidae), *Nectocarcinus integrifrons* and *Carcinus maenas* (Portunidae) and *Pinnotheres pisum* (Pinnotheridae). The majority of the species are found on the sandy areas around the edge of the Bay, particularly in the W. areas; no species was taken in the central deeper parts of the Bay. Ovigerous females of most species were collected in late summer. Parasitism by sacculinas was small and confined to two species of *Pilumnus*.

Introduction

The Survey was carried out over a period of six years (1957-63) and 317 stations were worked during this period (Macpherson and Lynch 1966). More than 1000 specimens of crabs were collected during the Survey and these form the subject of this report. A superficial collection of the fauna of Portland Harbour, on the Victorian coast near the S. Australian border, was made at the Ocean Pier on 9-10 June 1963 (Jeanette E. Watson, pers. comm.). One pile below the pier was taken as an average and a swathe was cut from top to bottom (32 ft). The material was sealed immediately in plastic bags. Bryozoa colonies were broken up for enclosed fauna, ascidians were closely examined and crustaceans removed. The specimens from the Portland Survey and a small collection from Western Port are treated together with the specimens from the Port Phillip Survey.

In a checklist of the Brachyura of Victoria published near the beginning of this century, Fulton and Grant (1906b) listed 37 species from Port Phillip and 38 species from Western Port; 24 of these species were listed as occurring in both areas. The following species listed by them are at present known by specific names other than those used in their list (current name in brackets): *Gonatorhynchus tumidus (Paramithrax barbicornis), Halimus truncatipes (Naxia spinosa), Leptomithrax australiensis (L. gaimardii), Pilumnus lanatus (P. etheridgei), Pilumnus pilosa (Heteropilumnus fimbriatus), Lioxantho haswelli (Megametope rotundifrons), Ovalipes trimaculatus (O. australiensis), Cyclograpsus punctatus (C. granulosus).* A number of other species is now placed in genera other than those used by Fulton and Grant. Sayce (1902) earlier gave a list of dredged Brachyura from Port Phillip; the species were identified by F. E. Grant. Several are not included in the list given by Fulton and Grant (1906b) and therefore we consider that Grant thought those earlier identifications to be in error.

Ward (1929), in a popular article on the

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crabs of Port Phillip, dealt with 21 species. All but four were ones listed by Fulton and Grant: *Paramithrax minor* (currently placed in *Notomithrax*), *Nectocarcinus tuberculosus, Paragrapsus quadridentatus* (listed by Fulton and Grant as *Casmagnathus* (sic) *quadridentatus* from Bass Strait and Victorian coast) and *Petalomera lamellata* (*P. lateralis* in caption to figure) were the additional species. Several species were discussed under different names from those used by Fulton and Grant.

The present report deals with 31 species—29 from Port Phillip, eight species from the Portland area and four from Western Port. References are given for each species, one to the original description, one to the most recent treatment of the species and one or more to any other which discusses the species in detail or provides an adequate illustration. The total number of males and females (including ovigerous females), the size range (in mm) and the size of the smallest ovigerous female are given. The size given is the greatest width across the carapace (abbreviated as c.w.) or the greatest length of the carapace (c.l.) and is exclusive of spines except in the majids and hymenosomatids where the length of the rostrum is included and in the portunids where the lateral 'teeth' are included. Measurements were made to the nearest 0·1 mm with dial calipers. The localities from which specimens were taken by the Survey are listed by area number (with station number in brackets); each station number is followed by the number of specimens. Special attention is paid to those species which proved difficult to identify, where the Port Phillip collection permitted clarification of interspecific differences, especially *Nectocarcinus* and *Pilumnus* species. The months during which ovigerous females were taken are listed for each species. Data on infestation by sacculinas are also included.

Family DROMIIDAE

Petalomera lateralis (Gray)

Dromia lateralis Gray, 1831: 40.
Petalomera lateralis; Rathbun, 1923: 153. Hale, 1927: 111-112, Figs. 108-109. Griffin, in press.

MATERIAL: 1 ♂, 1 ♀, c.w. 6·5, 11·3 mm. Survey areas 26 (301) 1 (number of specimens), 58 (293) 1.

REMARKS: The ridges on the ambulatory legs in this species are low and rounded, the carapace bears a close pubescence and the anterolateral teeth of the carapace are low and broad. These feaures are among those distinguishing *P. lateralis* from *P. lamellata* (Ortmann). See Griffin in press.

DISTRIBUTION: E., S., W. Australia from Low Isles, off Port Douglas, Qld., through N.S.W., Vict., Tasm., S. Aust. to Nickol Bay, a little N. of N.W. Cape, W. Aust. Intertidal to a depth recorded as '80-120 fm'. Unconfirmed records from Japan and the Philippine Islands.

Petalomera wilsoni (Fulton and Grant)

Cryptodromia wilsoni Fulton and Grant, 1902b: 61, Pl. 9 (*Dromia wilsoni* in caption).
Petalomera wilsoni; Rathbun, 1923: 154-156, Pl. 42, fig. 1. Hale, 1927: 113-114, Fig. 111. Dell, 1968: 14-17, Figs. 5-7, Pl. 2 (pleopods 1-2).

MATERIAL: 1 ♂, 1 ♀, c.w. 34·6, 41·2 mm. Survey area 58 (150-154) 1. Portland Pier Survey: from several small bryozoans under fisherman's pier, 9 June 63, 1 specimen.

REMARKS: These two specimens agree well with the previous description of this species. The pits and ridges formed by the tomentum on the carapace are characteristic.

DISTRIBUTION: SE. Australia from Port Stephens, N.S.W., through Vict. and Tasm. to a little W. of Kingston, SE. South Australia. Intertidal to 470 fm. N. and central New Zealand; central and S. Japan; Natal to Algoa Bay, S. Africa.

Dromidiopsis excavata (Stimpson)

Dromidia excavata Stimpson, 1858: 239; 1901: 172.
Dromidiopsis excavata; Rathbun, 1923: 146-147, Pl. 38. Hale, 1927: 110, Fig. 106.

MATERIAL: 1 ♂, 4 ♀ ♀ (2 ovig.), c.w. 18·8-42·4 mm, smallest ovig. ♀ 41·8 mm. Survey areas 10 (13-15) 1, 31 (10) 1 in red sponge, 59 (23) 2, 68 (220) 1.

REMARKS: These specimens agree with the brief description given by Rathbun. The transverse fringe of long hairs just behind the front of the carapace is very distinctive.

The ovigerous females were taken in September.

DISTRIBUTION: SE. and S. Australia from Port Stephens, N.S.W., through Vict. and Tasm.

to Nuyts Archipelago, Great Australian Bight, S. Aust. Intertidal to a depth recorded as '70-100 fm'.

Family LEUCOSIIDAE

Ebalia (Phlyxia) intermedia Miers

Ebalia (Phlyxia) intermedia Miers, 1886: 308. Pl. 25, fig. 2-2c. Tyndale-Biscoe and George, 1962: 74, Fig. 4.4 (pleopod 1).
Phlyxia intermedia; Hale, 1927: 198-199, Fig. 199.

MATERIAL: 43 ♂ ♂, 48 ♀ ♀ (5 ovig.), c.l. 6·2-13·3 mm, smallest ovig ♀, 9·8 mm. Survey areas 3 (202) 25, 6 (66-67) 2, 7 (208) 10, 9 (178, 180) and 19 (179-181) 9, 11 (195) 11, 13 (92, 94) 4, 16 (283) 8, 18 (308) 3, 22 (119) 1, 27 (284) 1, 31 (10) 2, 42 (38) 1, (288) 3, (289) 1, 43 (303) 1, 55 (256) 3, 68 (155) 2, (157) 3. Additional Material: Area 42, Indented Head shore coll., J.H.M., 16 Jan. 64, 1 specimen.

REMARKS: The specimens vary in the shape of the intestinal lobe and length of the intestinal spine. The margin of the lobe is sometimes weakly convex with the lateral angles obtuse and sometimes the lateral angles are acute and the posterior margin straight or very weakly concave. The intestinal spine is usually rather short and blunt but is sometmies quite sharp.

The ovigerous females were taken during March.

DISTRIBUTION: S. and W. Australia from Western Port, Vict., through Tasm. and S. Australia to Cottesloe, just N. of Fremantle, W. Australia. Intertidal to 33 fm.

Philyra laevis Bell

Philyra laevis Bell, 1855: 300, Pl. 32, fig. 7. Hale, 1927: 194-195, Fig. 195. Tyndale-Biscoe and George, 1962: 75, Fig. 4.7 (pleopod 1).

MATERIAL: 10 ♂ ♂, 7 ♀ ♀, c.l. 6·5-22·0 mm. Survey areas 6 (118) 1, 27 (Point Wilson shore coll., 28 April 1962) 3, 42 (Indented Head shore coll., 1 Mar. 1959) 1, 49 (236) 1, 58 (89) 8, 59 (36) 1. Addition material: French Is., Western Port Bay, 20 Jan. 1963, 2 specimens.

REMARKS: The small specimens (up to about 10 mm c.l) have the carapace sparsely granular, the lateral margins possess a few small tubercules or granules between the anterior two of the three usual subacute lobes and the merus of the chelipeds is finely granular, particularly on the outer face where some granules are larger than others. In larger specimens (c.l. 15 mm) only the the anterior part of the carapace is obviously granular.

DISTRIBUTION: S. Australia from Western Port, Vict., through Tasm. and S. Aust. to Albany area, SW. Western Australia. Intertidal to 6 fm.

Philyra undecimspinosa (Kinahan)

Bellidilia undecimspinosa Kinahan, 1856: 128, Pl. 3, fig. 2.
Ebalia (Phlyxia) undecimspinosa; Whitelegge, 1900: 162.
Philyra murrayensis Rathbun, 1923: 136-137, Pl. 34. Hale, 1927: 195-196, Fig. 196.
Philyra undecimspinosa; Griffin, in press.

MATERIAL: 5 ♂ ♂, 10 ♀ ♀ (5 ovig.), c.l. 9.1-30.7 mm, smallest ovig. ♀ 14·2 mm. Survey areas 3 (202) 6, 6 (63-67) 1, 7 (205) 3, 13 (82-83) 1, (94) 2, 43 (251) 2.

REMARKS: These specimens agree well with Kinahan's original description and with Rathbun's description of *Philyra murrayensis*. See Griffin, in press.

The ovigerous females were taken during March.

DISTRIBUTION: SE. and S. Australia from off Newcastle, N.S.W., through Vict. to S. Aust. waters (no detailed localities). Intertidal to 40 fm.

Family HYMENOSOMATIDAE

Halicarcinus ovatus Stimpson

Halicarcinus ovatus Stimpson, 1858: 109; 1907: 146. Stebbing, 1900: 523, Pl. 36A. Hale, 1927: 117, Fig. 113.

MATERIAL: 152 ♂ ♂, 138 ♀ ♀ (46 ovig.), c.l. 2·1-9·2 mm, smallest ovig. ♀ 4·4 mm. Survey areas 3 (202) 13, 5 (51) 3, (165-169) 6, 6 (66) 2, (118) 9, (136) 28, 7 (206) 14, (208) 1, 9 (84) 4, 9 (178, 180) and 19 (179-181) 7, 10 (13) 5, (Point Cook shore coll. 12 July 1960 2 specimens. 11 (190) 7, 13 (83) 1, (92) 8, 14 (4) 2, (95) 2, 16 (142) 7, 17 (173) 1, 18 (61) 3, 22 (119) 1, 27 (41) 8, (138-139) 2, (284) 3, 28 (140) 2, 30 (278) 2, 31 (10) 7, (275) 1, 39 (43) 1, 40 (101) 1, 42 Indented Head shore coll. 1 Mar. 59) 1, (109) 14, (281) 3, 50 (228) 5, (233) 3, (238) 1, 51 (250) 1, (271) 8,

55 (35) 7, (39) 10, 58 (80-81) 2, (88) 12, (150-154) 2, 59 (25) 3, (36) 4 visits, 14 specimens, (224) 2, 60 (235) 1, 61 (239) 2, (242) 1, 62 (96) 1, 64 (163) 6, 67 (216-217) 2, 68 (155) 12, 69 (221) 1. Portland Pier Survey: From Bryoza 10-15 ft, J.E.W. 10 June 63, 2 specimens; in ascidian, just below low water mark 10 June 63, 1 specimen; in ascidian and sponge 30 ft, J.E.W. 10 June 63, 4 specimens; in fold in ascidian 20 ft, J.E.W. 9 June 63, 1 specimen; with encrusting ascidian (*Ascidia sydneiensis* Stimpson) 24 ft, J.E.W., 10 June 63, 1 specimen; in ascidian 9 ft, J.E.W., 9 June 63, 2 specimens; in ascidians, J.E.W., 9 June 63, 1 specimen; with ascidians (*Ascidia sydneiensis* Stimpson) 10 ft, J.E.W., 7 June 63, 1 specimen; with ascidians *Cystodites dellechiajei* (Della Valle) 10 ft, J.E.W., 9 June 63, 2 specimens; with ascidians *Herdmania momus* (Savigny) 15-30 ft, J.E.W., 9 June 63, 3 specimens; with ascidians *Sycozoa cerebritiformis* Quoy and Gaimard 24 ft, J.E.W., 9 June 63, 2 specimens; from Bryozoa under fisherman's pier, J.E.W., 7 June 63, 3 specimens.

REMARKS: Of the wide variation shown by this species, that involving the rostrum, the pubescence of the carapace and legs, and the development of the proximal tooth on the dactyl of the cheliped in the male, is particularly obvious in the series examined here. The three rostral lobes are usually distinctly separated from each other throughout their length, subequal in length and more or less parallel. In most of the specimens from Portland Pier, however, the lateral rostral lobes are distinctly outwardly directed and are slightly more widely separated from the medial lobe than in most of the specimens from Port Phillip. In one specimen (ovig. ♀, c.l. 6·5 mm from Area 5) the medial lobe is a little longer than the laterals. In a large ♂ (c.l. 9·2 mm from Areas 9 and 19) the three lobes are adpressed throughout their length, the laterals curving inwards to meet the medial lobe from the base to the tip. The carapace is usually naked but several specimens have the dorsum of the carapace covered by hairs. The proximal, apically truncate, tooth on the inner edge of the dactyl in the male is present, although very small, in males from a carapace length of about 4 mm and is prominent in large males (about 6 mm and above). In a few cases there is no marked proximal gape between the dactyl and fixed finger. In two males (c.l. 5·2 from Area 16, and c.l. 6·2 mm from Area 18) there is no trace of a proximal tooth and the fingers are adjacent throughout their length. Males as small as 2·5 mm possess well-developed pleopods.

Ovigerous females were taken in all months except July, November and December when no samples of this species were collected.

DISTRIBUTION: SE., S, and W. Australia from Sydney, N.S.W., through Vict., Tasm. and S. Aust. to Woodman's Point, just S. of Fremantle, W. Aust. Intertidal to 33 fm.

Halicarcinus rostratus (Haswell)

Hymenosoma rostratus Haswell, 1882: 550.
Halicarcinus rostratus; Kemp, 1917: 247. Hale, 1927: 117-118, Fig. 114.

MATERIAL: 17 ♂ ♂, 25 ♀ ♀ (17 ovig.), c.l. 2·1-9·2 mm, smallest ovig. ♀ 4.4 mm. Survey areas 11 (190) 5, 12 (196) 3, 14 (175) 1, 18 (308) 1, 19 (305) 1, 20 (124) 3, 36 (74, 76-77) 3, 39 (43) 1, 42 (109) 1, 43 (263) 1, 53 (253) 1, 55 (149) 4, 61 (241) 8, 62 (96) 2, (243-244) 2, 63 (21) 1, (162) 2, 68 (155) 2.

REMARKS: In males of this species less than about 6 mm c.l. the fingers of the chelae are adjacent throughout their length and lack the distinctive tooth pattern found in larger specimens.

Ovigerous females are present in samples taken during December, February, March, April, June and July.

DISTRIBUTION: S. Australia from Western Port, Vict., to Kangaroo Island and S. Aust. waters (no detailed localities). Intertidal to 11 fm.

Family MAJIDAE

Paratymolus latipes Haswell

Paratymolus latipes Haswell, 1880: 303, Pl. 16, figs. 3-5.
Paratymolus latipes var. *quadridentatus* Baker, 1906: 107, Pl. 1, fig. 2. Hale, 1927: 123, Fig. 119.

MATERIAL: 1 ♀, c.l. 6·4 mm. Portland Pier Survey: From small Bryozoa under fisherman's pier, 9 June 63, 1 specimen.

REMARKS: This specimen for the most part agrees with previous descriptions under the name *P. latipes* and *P. latipes* var. *quadridentatus*. The three anterolateral spines on each side have one tubercle midway between each at a slightly higher level. The merus of the cheliped bears one spine midway along the dorsal edge, and there are four similar spines along the ventrolateral edge. The palm of the chela is short and distally high and the dorsal edge bears two short, distally-directed spines.

DISTRIBUTION: E., S. and SW. Australia from Port Denison, Bowen, Qd., through N.S.W., Vict. and S. Aust. to Cockburn Sound, near Fremantle, W. Aust. Subtidal to 27 fm. Unconfirmed record from Ponape, Micronesia. This species has not been recorded previously from Victoria.

Naxia deflexifrons (Haswell)

Microhalimus deflexifrons Haswell; 1880: 435, Pl. 25, fig. 2.
Naxia (Microhalimus) deflexifrons; McCulloch, 1913: 330, Pl. 10, figs. 1-4.

MATERIAL: 4 ♂♂, 1 ♀, c.l. 6·3-15·0 mm. Survey areas 58 (88) 2, (150-154) 2, 59 (36) 1.

REMARKS: The five small specimens agree in all features with the descriptions and figures given by Haswell and McCulloch. The prominent lobe medial to the supraorbital eave is not obvious in small specimens, and the anterolateral spine of the basal antennal article is usually directed slightly laterally rather than forwards as shown by McCulloch.

DISTRIBUTION: SE. Australia from Port Jackson, N.S.W., through Bass Strait to Port Phillip, Vict. Intertidal to 37 fm.

Naxia aurita (Latreille)

Pisa aurita Latreille, 1825: 140.
Naxia aurita; Hale, 1927: 129, Fig. 127. Balss, 1935: 120 (synon.).

MATERIAL: 9 ♂♂, 9 ♀♀, c.l. 15·0-41·5 mm. Survey areas 26 (300) 2, 40 (Clifton Springs intertidal coll., 1 Mar. 59) 1, (101) 1; 42 (Indented Head intertidal coll. 1 Mar. 59) 3, (108) 1, 50 (233) 2, 59 (214) 1, (224) 2, 60 (235) 2, 67 (216) 1. Additional material: Area 42, Indented Head shore coll., 16 Jan. 64, 2 specimens.

REMARKS: This reasonably large series, comprising mostly small specimens, indicates that the best single features distinguishing small specimens of this species from small specimens of *N. aries* (Guérin) (see Hale 1927: 127, Fig. 128) is the straight, stout rostral spines. In small specimens of the present species the marginal spines of the carapace are relatively long as in *N. aries*.

DISTRIBUTION: S. and SW. Australia from D'Entrecasteaux Channel, Tasm., and Port Phillip, Vict., through S. Aust. to Abrolhos Islands, W. Aust. Intertidal to 8 fm.

Naxia tumida (Dana)

Halimus tumidus Dana, 1852: 115, Pl. 4, fig. 2a-g.
Naxia tumida; Hale, 1927: 128, Fig. 126. Balss, 1935: 121 (synon.).

MATERIAL: 2 ♂♂, 4 ♀♀ (1 ovig.), c.l. 9·1-15·8 mm, ovig. ♀, 15·8 mm. Survey areas 58 (150-154) 2, (290) 1, 59 (79) 1, (87) 2.

REMARKS: The anterior part of the lateral margin of the basal antennal article bears one or a few short spines in all specimens, a feature characteristic of this relatively small species of *Naxia*.

The ovigerous female was collected in May.

DISTRIBUTION: E. and S. Aust. from Moreton Bay, Qd., through N.S.W. and Vict. to Kangaroo Is. and St. Vincent's Gulf, S. Aust. Intertidal to 7 fm.

Notomithrax minor (Filhol)

Paramithrax minor Filhol, 1885: 3; 1886: 356, Pl. 40, figs. 4-5, 7.
Notomithrax minor; Griffin, 1966: 53-57, Figs. 10, 21-3, 4.

MATERIAL: 70 ♂♂, 85 ♀♀ (42 ovig.), c.l. 5·2-37·0 mm, smallest ovig. ♀ 11·3 mm. Survey areas 3 (202) 5, 5 (51) 2, (166, 168) 3, 6 (66) 8, (118) 1, (137) 9, 7 (123) 1, (204) 7, (207) 1, (208) 16, 9 (178, 180) and 19 (179, 181) 2, 10 (103) 10, 11 (125) 1, (190) 13, 12 (196) 1, 13 (82-83) 5, (92, 94) 14, (209) 2, 16 (143) 2, 17 (170) 1, 18 (308) 1, 19 (305) 1, 21 (115) 1, 23 (2) 4, (68, 70) 4, (71) 1, 26 (301) 1, 27 (41) 1, 28 (141) 1, 29 (107) 1, (287) 1, 30 (278) 1, 35 (121) 2, 36 (77) 1, 37 (40) 3, 42 (Indented Head intertidal coll., 31 Mar. 59) 1, (108-109) 1, 50 (233) 1, 55 (35) 3, (Half Moon Bay intertidal coll., 14 Jan. 58) 1, (39) 3, (149)

1, (256) 1, 61 (239) 2, (242) 1, 62 (243-244) 1, 63 (20) 4, (159) 2, (245) 4, 68 (158) 1, (220) 1.

REMARKS: The very large series agrees in all features with material from New Zealand previously reported on by Griffin (1966) and from Australia recorded by Rathbun (1918) and by Haswell, Whitelegge, Fulton and Grant and Grant and McCulloch as *Paramithrax peronii* (for synonymy see Griffin 1966). There are low spines in the midline of the carapace, the protogastric regions are smooth and the marginal spines are alternately large and small. Small specimens (less than about 15 mm c.l.) have the anterolateral lobe of the basal antennal article spinulate or crenulate laterally and in many cases very small specimens have secondary spinules on the marginal spines.

Ovigerous females were taken in January, March, April, May, July, October, November and December.

DISTRIBUTION: E. and SE. Australia from Port Curtis, Gladstone, Qd., through N.S.W. to Port Phillip, Vict., and Tasm. Subtidal to a depth recorded as '22-60 fm'. N. and S. New Zealand to 70 fm.

Leptomithrax gaimardii (H. Milne Edwards)

Paramithrax gaimardii H. Milne Edwards, 1834: 325.
Leptomithrax autraliensis; Hale, 1927: 135-136, Fig. 135.
Leptomithrax gaimardii; Griffin, 1963: 133-137, Figs. 1-6, Pls. 6-7.

MATERIAL: 9 ♂♂, 7 ♀♀, c.l. 7·0-147·0 mm. Survey areas 18 (307-308) 1, 20 (309) 1, 27 (49) 1, 42 (108-109) 1, 43 (303) 1, 50 (228) 1, 51 (271) 1, 58 (150-154) 1, 59 (227) 1, 68 (220) 1, 69 (100) 1, (221) 1. Portland Pier Survey: on bottom and lower piles 10 June 63, 2 specimens; from bottom below piles 10 June 63, 1 specimen; J.E.W. (no date), 1 specimen.

REMARKS: Almost all the specimens have the carapace and chelipeds spinous rather than tuberculate. In all important features they agree with specimens previously reported on by various authors (see references Griffin 1963). This species is easily recognized by the orange, transversely oval, naked area at the junction of the ischium and merus of the third maxilliped endopod.

The figures given by Griffin (1963), drawn from photographs of the holotype, do not accurately show the spinules around the orbit; the eave bears a number of spinules close to the margin, the intercalated spine bears several short, sharp spinules anteriorly and posteriorly near its base and the postorbital lobe bears a short stout spine on the anterior upper border about 0·3 of its length from the base.

DISTRIBUTION: SE. and S. Aust. from Shoalhaven Bight, off Nowra, N.S.W., through Vict., Tasm. and S. Aust. to Oyster Harbour, Albany, SW. Western Australia. Intertidal to a depth recorded as '250-450 fm'.

Family PORTUNIDAE

Carcinus maenas (Linnaeus)

Cancer maenas Linnaeus, 1758: 627.
Carcinus maenas; Stephenson and Campbell, 1960: 80-82, Figs. 1A, 2A; Pl. 1, fig. 1; Pl. 5A.

MATERIAL: 5 ♂♂, 16 ♀♀, c.w. 13·7-36'·9 mm. Survey areas 5 (Altona intertidal coll.) 1 specimen, 9 (84) 14, 42 (38) 2, 58 (89) 4.

REMARKS: The 21 specimens have a granular carapace and the dactyl of the fifth leg (swimming paddle) is extremely narrow as is typical of this species.

DISTRIBUTION: SE. Aust. from Mallacoota Inlet, Vict. (near N.S.W. border) to Port Phillip, Vict. Intertidal. N. Atlantic; unconfirmed records from Red Sea and Hawaii.

Nectocarcinus integrifrons (Latreille)

Portunus integrifrons Latreille, 1825: 192.
Nectocarcinus integrifrons; A. Milne Edwards, 1861: 406-407, Pl. 38. Hale, 1927: 152-153, Fig. 153. Stephenson and Campbell, 1960: 83-84, Fig. 2B; Pl. 1, fig. 2; Pls. 5B, 6A.

MATERIAL: 18 ♂♂, 19 ♀♀ (2 ovig.), c.w. 5·3-73·6 mm, smaller ovig. ♀ 28·4 mm. Survey areas 3 (203) 1, 5 (51) 1, (168) 2, 7 (123) 2, 9 (178, 180) and 19 (179-181) 4, 10 (14) 2, 11 (190-192) 2, 14 (95) 1, 17 (173) 2, 18 (60-61) 3, 27 (41) 1, 39 (45) 1, 40 (101-102) 2, 42 (108-109) 4, 50 (228) 1, 51 (250) 1, (271) 1, 55 (39) 3, 59 (224) 1, 63 (21) 1. Additional material: Area 42 (Indented Head intertidal coll., 16 Jan. 64) 3 specimens. Portland Pier Survey: from bottom under pier 32 ft, 9 June 63, 1 specimen.

REMARKS: The following features, typical of this species, are present in the material from

Port Phillip. The frontal margin is smoothly but weakly convex, sometimes with a minute medial notch in very small specimens (c.w. less than 20 mm), or a shallow medial emargination in larger specimens; in one specimen (52 mm ♂ from Portland Pier) the medial frontal notch is prominent and narrow. In moderately large specimens the front is bordered in dorsal view by a single row of numerous small rounded tubercles with similar tubercles, fewer in number, behind them; a second, ventral, row of tubercles separated from the first by a fringe of hairs, is visible only in frontal view. Above the antenna, the frontal margin is very shallowly concave and the junction with the orbital margin is usually smoothly rounded. The anterolateral teeth of the carapace are sharp spines; in medium sized specimens these bear tubercules around their bases and along the lateral surfaces. The protogastric regions each possess a low elevation bearing small tubercles, and in front of these are more tubercles on a weak elevation. Usually the larger, posterior pair of elevations are weakly convex posteriorly and declivous anteriorly. In two specimens (males, 28·0, 31·2 mm, Area 10) the posterior elevations are uniformly convex, the anterior ones weakly declivous. The inner margin of the carpus of the cheliped bears several small tubercles in a row from the tip of the main spine to the articulation with the chela; in very small specimens there is usually no trace of spines or tubercles. In a few specimens between 20 mm and 30 mm c.w. these tubercles are sharp and enlarged. The surface of the carapace is pubescent in most of the specimens and beneath this the carapace is weakly tuberculate.

The ovigerous females were collected in March and October.

DISTRIBUTION: SE., S. and SW. Aust. from Port Stephens, N.S.W., through Vict., Tasm., S. Aust. to Cockburn Sound, a little S. of Fremantle, W. Aust. Intertidal to 8 fm.

Ovalipes australiensis Stephenson and Rees

Ovalipes bipustulatus; Hale, 1927: 147-148, Fig. 148. (Not *Platyonichus bipustulatus* H. Milne Edwards, 1834.)

Ovalipes autraliensis Stephenson and Rees, 1968: 227-232, Figs. 1-4; Pls. 35, 39, 41-42.

MATERIAL: 2 ♀ ♀, c.w. 24·3-57·1 mm. Survey areas 59 (36) 1, 63 (Safety Beach intertidal coll., 22 Sept 63) 1 specimen.

REMARKS: Both specimens have the carapace anteriorly granulate dorsally and a pair of orange (in alcohol) spots posteriorly; both features are characteristic of this species.

DISTRIBUTION: E., S. and SW. Aust. from Wide Bay, just S. of Fraser Is., Qd., through N.S.W., Vict., Tasm. and S. Aust. to Rottnest Is. and Cottesloe, just N. of Fremantle, W. Aust. (Presumably 'Shark Bay' in Stephenson and Rees 1968: 231 is a *lapsus* for Geographe Bay.) Subtidal to about 33 fm (60 m). Lord Howe Is., Tasman Sea.

Family XANTHIDAE

Actaea peronii (H. Milne Edwards)

Xantho peronii H. Milne Edawrds, 1834: 392.

Xantho spinosus Hess, 1865: 132, Pl. 6, fig. 3 (leg only).

Actaea peronii; Rathbun, 1923: 107, Pl. 21, figs. 4-5. Hale, 1927: 159, Fig. 159.

MATERIAL: 4 ♂ ♂, 6 ♀ ♀, c.w. 5·1-15·9 mm. Survey area 59 (Portsea Pier intertidal coll., 22 Mar. 1960) 1 specimen. Portland Pier Survey: from several small Bryozoa, 9 June 63, 7 specimens; in Bryozoa 15 ft, J.E.W., 9-10 June 63, 4 specimens.

REMARKS: All specimens possess the very long spines on the dorsal surface of the ambulatory carpi and propodi typical of this species. The tubercles on the lateral parts of the carapace are very large and rounded and the tubercles on the central areas are much lower and more discrete in small specimens with a tendency to become separated by transverse grooves anteriorly so that the carapace has the appearance of bearing numerous short transverse grooves centrally.

DISTRIBUTION: SE. and S. Aust. from Port Stephens, N.S.W., through Vict. and Tasm. to Spencer Gulf, S. Aust. Subtidal to a depth recorded as '70-80 fm'. Unconfirmed record from Samoa.

Two so-called subspecies of *A. peronii* have been recorded from Australia—*A. p. squamosa* Henderson from Torres Strait by Calman (1900) and *A. p. occidentalis* Odhner from SW. Australia (Odhner 1925: 58); the present

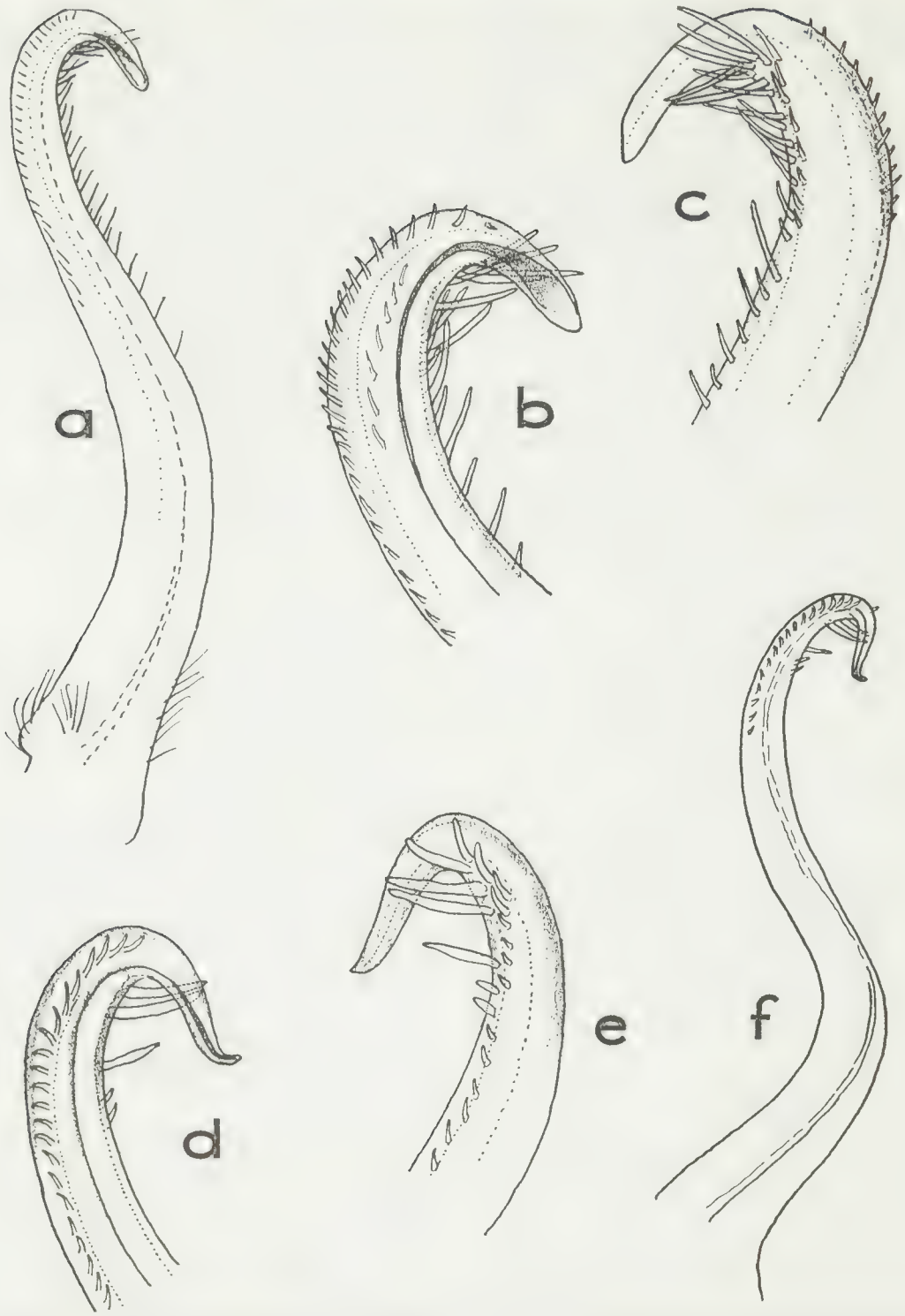

Fig. 1—Left first pleopods of males of *Pilumnus acer* (a-c), HOLOTYPE, c.w. 20·4 mm, 60-80 mi W. of Eucla, Great Australian Bight (AM E.3178) and *P. etheridgei* (d-f), HOLOTYPE, c.w. 15·6 mm, 10 mi N. of Circular Head, Tasm. (AM E.6490). a, f, whole pleopod, abdominal aspect; b, d, tip, abdominal aspect; c, e. tip, sternal aspect.

series from Victoria appears to belong to the typical form of *P. peronii*.

Pilumnus acer Rathbun (Fig. 1a-c)

Pilumnus acer Rathbun, 1923: 124-125, Pl. 29. Hale, 1927: 165-166, Fig. 166.

MATERIAL: 13 ♂ ♂, 4 ♀ ♀ (1 ovig.), c.w. 5·1-21·0 mm, ovig. ♀ 21·0 mm. Survey areas 5 (58) 1, 27 (41) 3, 58 (89) 1, 59 (intertidal coll., 20 Mar. 60) 4, (36) 3, 61 (37) 1, 66 (292) 1. Portland Pier Survey: from small Bryozoa under fisherman's pier, J.E.W., 9 June 63, 1 specimen; in Bryozoa 15 ft, J.E.W., 10 June 63, 1 specimen; from Bryozoa 15 ft, J.E.W., 9 June 63, 1 specimen.

REMARKS: The very long, simple hairs forming a sparse but obvious fringe just behind the front, together with the long, simple, curved anterolateral spines, smooth carapace and the presence of sharp spines on the ambulatory meri and carpi, but not propodi, distinguish this species from its southern temperate congeners (see Table 1). Very small specimens (up to about 8 mm c.w.) have tufts of long thick hairs on the dorsal surface of the carapace.

The ovigerous female was taken in December. The preserved eggs are large (1·3 to 1·5 mm in diameter) suggesting that abbreviated or direct development may take place in this species as has been recorded for the Australian *Pilumnus vestitus* and the two New Zealand species of *Pilumnus, P. novaezealandiae* and *P. lumpinus* (see Wear 1967).

DISTRIBUTION: S. Australia from Port Phillip, Vict., through S. Aust. to a little W. of Eucla, Greath Australian Bight, W. Aust. Subtidal to a depth recorded as '80-120 fm'. This species has not been previously recorded from Victoria.

Pilumnus etheridgei Rathbun (Fig 1d-f)

Pilumnus lanatus; Fulton and Grant, 1906b: 18. (Not *Pilumnus lanatus* Latreille, 1825.)
Pilumnus etheridgei Rathbun, 1923: 117-119, Pl. 26. Balss, 1933: 27.

MATERIAL: 3 ♂ ♂, 3 ♀ ♀, c.w. 5·6-13·3 mm. Survey areas 58 (88) 3, (154) 1, 59 (36) 1, 66 (292) 1.

REMARKS: The characteristic features of this species are the sparse, moderately long, simple hairs which generally occur on the anterior half to two-thirds of the carapace dorsally and on the chelipeds and ambulatories (the ventral half or slightly more of the outer surface of the palm of the major chela is naked or bears some very slender hairs), the presence of sharp spines on the ambulatory carpi and propodi dorsally and the apically very strongly recurved first pleopod in the male. Accessory spinules are seldom present on the anterolateral spines.

Even small male specimens (about 8 mm c.w.) can be distinguished from the similar *P. acer* by the shape of the first pleopod, which is apically rather weakly curved in the latter species, and by the absence of a fringe of long hairs close to the front of the carapace.

DISTRIBUTION: S. and SW. Aust. from Oyster Bay, E. Tasm., through Vict. and presumably S. Aust. (but no records available) to off Fremantle, W. Aust. Subtidal to 26 fm.

Pilumnus monilifer Haswell (Fig. 2d-f)

Pilumnus monilifera (sic) Haswell, 1881: 543-544; 1882: 65, Pl. 1, fig. 3.
Pilumnus monilifer; Hale, 1927: 163, Fig. 163.

MATERIAL: 37 ♂ ♂, 38 ♀ ♀ (3 ovig.), c.w. 4·1-21·7 mm, smallest ovigerous ♀ 9·1 mm. Survey areas 5 (51) 3, (Point Cook intertidal coll. 12 July 60) 6 specimens; 6 (137) 4, 10 (14) 1, 11 (190) 1, 14 (95) 1, 26 (301) 4, 27 (41) 10, (138) 1, 28 (141) 3, 30 (278) 1, (279) 2, 31 (131-134) 3, 37 (40) 1, 39 (43) 1, 42 (281) 1, 55 (149) 1, 58 (80) 3, 59 (36) 3, 61 (37) 1, (239) 2, 62 (96) 1, 68 (155) 1, 69 (221) 1, (222) 1. Portland Pier Survey: in sponges 10 ft, J.E.W., 10 June 63, 1 specimen; from Bryozoa 10-15 ft, J.E.W., 10 June 63, 2 specimens; from Bryozoa 15 ft, J.E.W., 9 June 63, 2 specimens; from small Bryozoa under fisherman's pier, J.E.W., 4 June 63, 13 specimens.

REMARKS: Large specimens (greater than about 12 mm c.w.) of the present series agree with the type material of Haswell's species (in Australian Museum—see Griffin, in press) particularly in the following features: there are tubercles on the anterolateral subspiniform lobes; an elevated group of about six tubercles is situated close to the anterolateral margin; the chelipeds and legs are mostly covered by a very dense mass of very short, 'clubbed' hairs

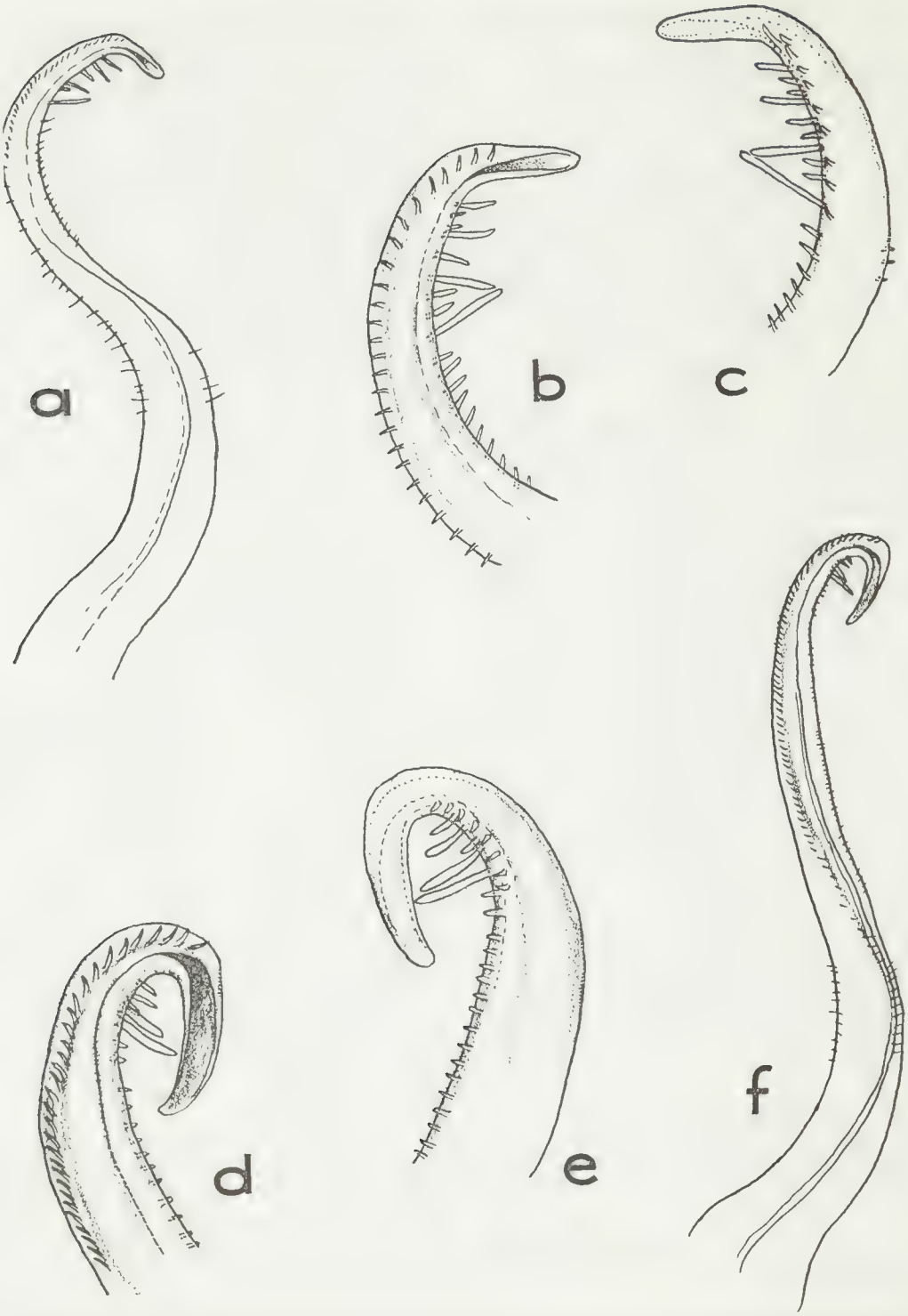

Fig. 2—Left first pleopods of males of *Pilumnus rufopunctatus* (a-c), c.w. 20·6 mm, Cabbage Tree Bay, N.S.W. (AM P.860) and *P. monilifer* (d-f), c.w. 21·0 mm, rocky shore below low tide mark, Beaumaris, Port Phillip, Vict. (AM P.9231). a, f, whole pleopod, abdominal aspect; b, d, tip, abdominal aspect; c, e, tip, sternal aspect.

with expanded setose tops; the outer surface of the palm of the major chela is covered by tubercles for slightly more than the dorsal half, and the ambulatory carpi and propodi possess several tubercles more or less in a double row dorsally. The tubercles on the carapace, chelipeds, and legs in most cases have retained a red colour and barely show through the mat of short hairs. The tubercles on the outer surface of the palm of the major chela tend to cover more of the surface in females than in males. In addition, the first pleopod of the male is apically strongly recurved with short hairs along the medial and lateral surfaces in the distal third to one half and a group of very long hairs on the lateral surface of the apical curve. In most specimens the carapace bears several tufts of very stout, long hairs.

In the key to Australian *Pilumnus* species given by Rathbun (1923: 108-110), *P. monilifer* is placed in that group of species having the carapace covered only by short hairs mixed with long hairs, and is distinguished from others in that group (particularly *P. rufopunctatus* Stimpson) in having the anterolateral lobes 'capped by a cluster of granules'. Hale (1927: 162-163), in a key to S. Australian species based on Rathbun's key, states that *P. monilifer* differs from *P. rufopunctatus* in lacking bead-like granules showing through the pubescence. Thus, in both Rathbun's and Hale's keys, large specimens from the present series come out only with difficulty.

Initially, many of the small specimens (less than about 12 mm c.w.) in the present series (now assigned to *P. monilifer*) were separated as a distinct species on the basis of the absence of obvious tubercles from the carapace and ambulatories, the simple spiniform nature of the anterolateral lobes and the less strongly apically curved first pleopod in the males. In those specimens from areas where silt and clay make up the dominant fraction of the substrate, the carapace, chelipeds and ambulatories possess many tufts of long thick hairs. However, these small specimens were identified as *P. monilifer* when it was found, from examination of large series of other species of *Pilumnus*, that in general smaller specimens in this genus tend to be less tuberculate and spinous than adults and that in small males the first pleopod is less strongly curved apically. It must be stressed that some specimens of *P. monilifer* as small as 9 mm c.w. have supplementary tubercles on the slopes of the anterolateral lobes and that most specimens above this size possess at least three tubercles in a group near the anterolateral border.

Two other species of south-eastern Australian *Pilumnus* possess the close pubescence of the 'clubbed' type found on *P. monilifer*—*P. rufopunctatus* and *P. fissifrons* Stimpson (see Table 1). These also agreee in the general arrangement of hairs and tubercles on the outer surface of the palm of the major chela and the dorsal surfaces of the ambulatories, but differ in the tuberculation of the carapace in adults. However, *P. rufopunctatus* never possesses tufts of long thick hairs and in *P. fissifrons* the first pleopod in males lacks long hairs laterally near the apical curve. It is by these features that *P. monilifer* can be distinguished from its congeners, not really by the characters selected by Rathbun and incorrectly modified by Hale.

The ovigerous females were taken in June and September.

One specimen, a female, c.w. 8·8 mm, is infested with a *Sacculina*.

DISTRIBUTION: Southern Australia from Victorian, Tasmanian and S. Australian waters (no detailed range limits available). Intertidal to 10 fm.

Pilumnus tomentosus Latreille (Fig. 3a-c)

Pilumnus tomentosus Latreille, 1825: 125. Rathbun, 1923: 119-122, Pl. 27, figs. 1-2. Hale, 1927: 166. Fig. 167. Balss, 1933: 23 (part: not Pl. 3, figs. 14-15).

MATERIAL: 16 ♂♂, 34 ♀♀, c.w. 5·6-39·6 mm. Survey areas 5 (51) 1, (166) 1, 6 (66) 1, (137) 1, 7 (123) 2, 10 (13) 4, 11 (190) 3, 13 (94) 4, 14 (4) 2, 16 (142) 1, 17 (172) 1, 18 (308) 1, 26 (301) 3, 28 (286) 2, 35 (121) 3, 36 (77) 1, 39 (43) 1, 40 (101) 1, 47 (29) 1, 51 (250) 2, 62 (96) 3, 63 (20) 2, 64 (164) 3, 69 (100) 1, (222) 1. Additional Material: Areas 63 (1 mile 1·6 km, off Dromana on sandy bottom, dredged 3 fm 22 Sept. 62), 2 specimens; 68 (1·5 miles, 2·4 km, off Rye Pier 7 fm, T. Crawford 16 Mar. 63), 2 specimens.

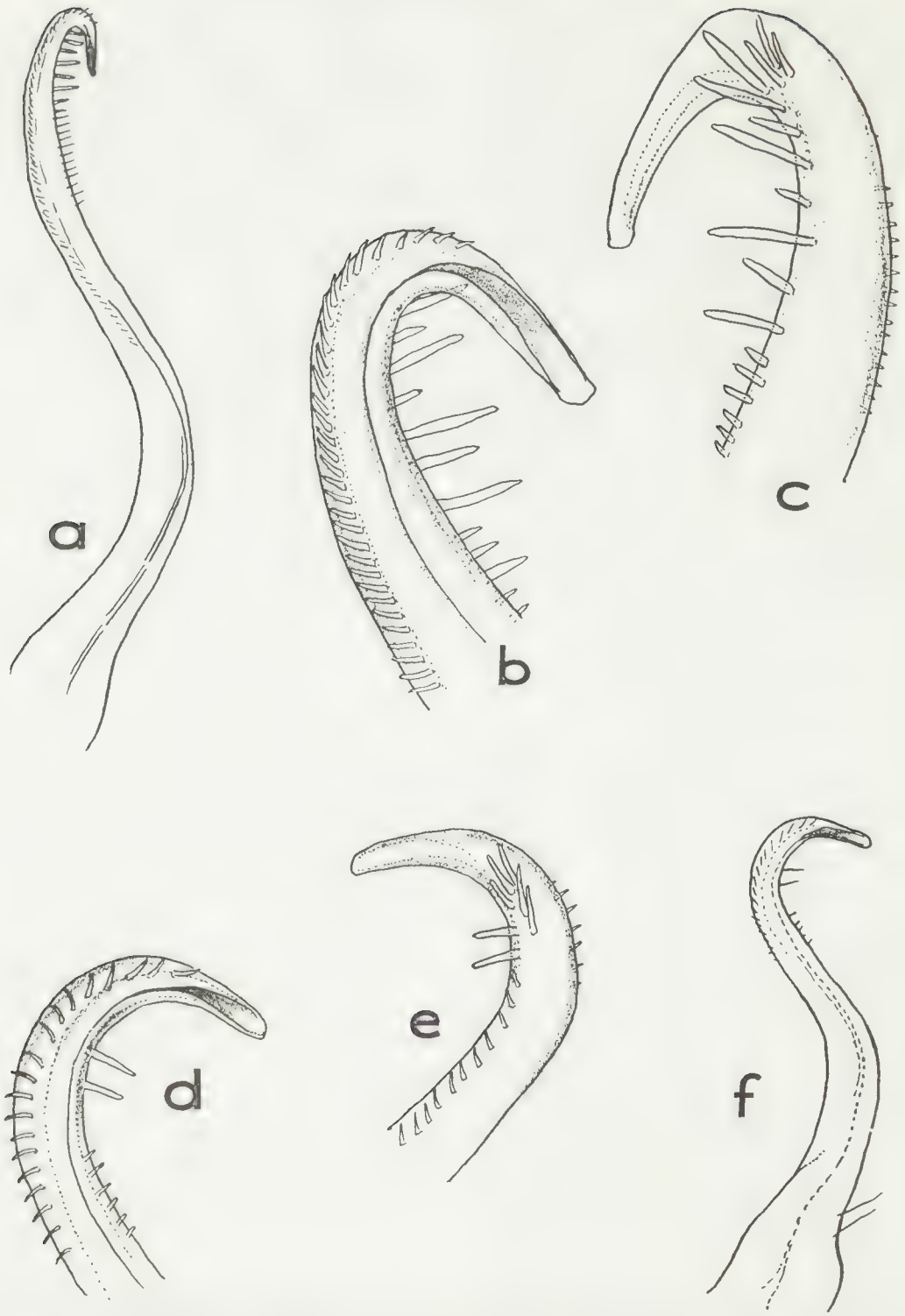

Fig. 3—Left first pleopods of males of *Pilumnus tomentosus* (a-c), c.w. 31·7 mm, 80-120 fm, 60-80 mi W. from Eucla, Great Australian Bight (AM P.3562) and *P. australis* (d-f), c.w. 10·6 mm, from intestine of Nannygai (fish) caught at Shellharbour, N.S.W. (AM P.8442). a, f, whole pleopod, abdominal aspect; b, d, tip, abdominal aspect; c, e, tip, sternal aspect.

REMARKS: This species is characterized mainly by the presence of long, simple hairs rather densely covering the carapace, chelipeds and legs, the presence of tubercles over all of the outer surface of the palm of the major chela—these tubercles tend to be pointed and longer, but sparser, dorsally—and by the lack of spines or tubercles on the carpi and propodi of the ambulatory legs. Larger specimens (above about 25 mm c.w.) usually have one to three spinules or tubercles on the posterior slopes of the anterolateral spines and about three spines on the dorsal surface of the carapace near the anterolateral border. Small specimens (less than 15 mm c.w.) often possess tufts or long thick hairs on the dorsal surface of the carapace and along the dorsal and ventral edges of the ambulatory legs and usually lack spines on the dorsal surface of the carapace and lack spinules on the anterolateral lobes.

Nine specimens ranging in size from 8·5-12·5 mm c.w., are infested with sacculinas.

DISTRIBUTION: SE. and S. Australia from off Newcastle, N.S.W., through Vict., Tasm. and S. Aust. to Albany in SW. Western Australia. From 3 fm to a depth recorded as '200-300 fm'. Extra-Australian records of *P. tomentosus* are now considered as referring to other species of this genus (see Griffin, 1970).

General remarks on SE. Australian *Pilumnus* species

Nine species of *Pilumnus* occur in SE. Australia. (Balss 1933: 11-13, has transferred the deep water *P. spongiosus* Nobili *to Planopilumnus*; *P. terraereginae* Haswell is described and figured elsewhere (Griffin, 1970)). Table 1 compares seven of these with respect to a number of characters. Four have been collected in the Port Phillip Survey and two others have

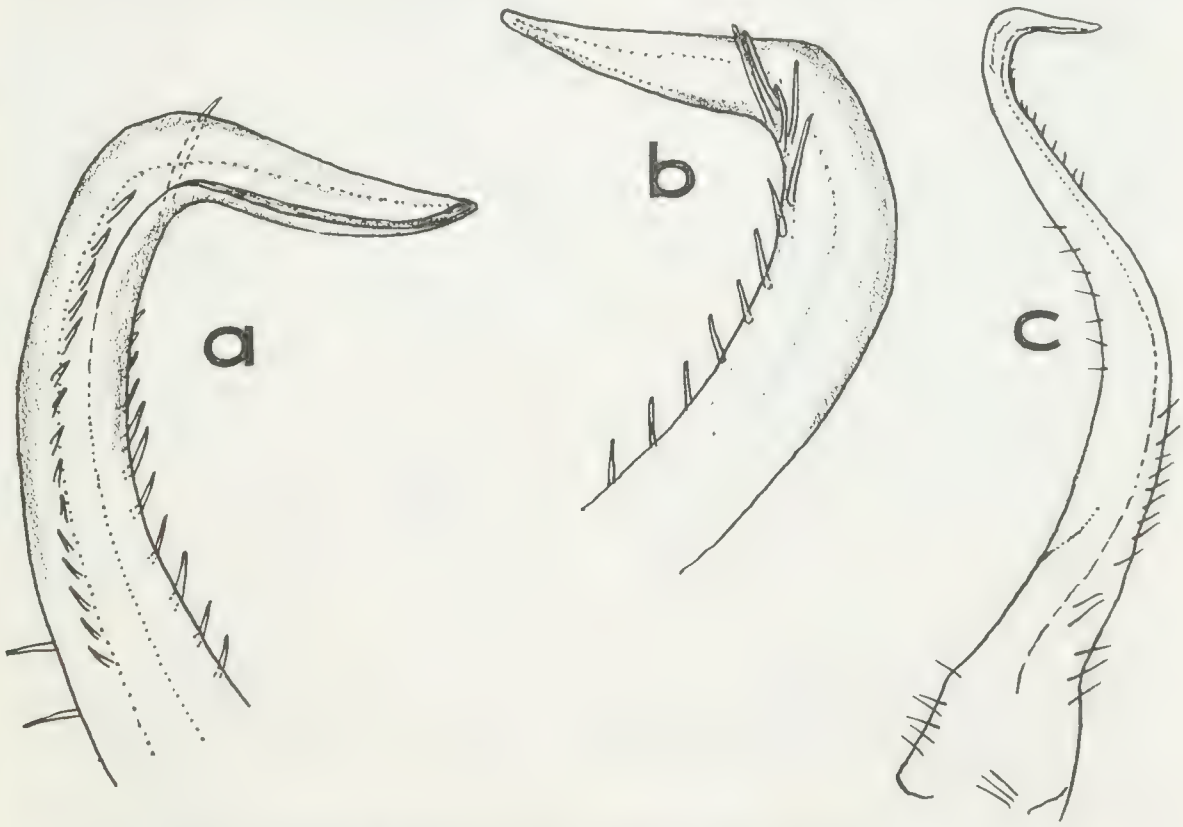

Fig. 4—Left first pleopod of male of *Pilumnus fissifrons*, c.w. 13·7 mm, among growth on hull of H.M.A.S. *Penguin* in dock, Cockatoo Island, Port Jackson, N.S.W. (AM P.8563). a, tip, abdominal aspect; b, tip, sternal aspect; c, whole pleopod, abdominal aspect.

been discussed in relation to *P. monilifer*. The seven species can be divided into two groups which are fairly easy to separate from each other: *P. monilifer, P. rufopunctatus* Stimpson (see Rathbun 1923: Pl. 24, figs. 3-4, and Takeda and Miyake 1968: 12-15, Fig. 3a-c, Pl. 1D) and *P. fissifrons* Stimpson (see Hale 1927: Fig. 164, Takeda and Miyake 1968: 15-17, Fig. 3d-f, Pl. 1A), share features of hairyness and ornamentation of the carapace, chelipeds and ambulatory legs and differ in these features from *P. tomentosus, P. acer, P. australis* Whitelegge (see Whitelegge 1900: Pl. 35, figs. 1-4) and *P. etheridgei*, which, however, differ from each other in ornamentation of the ambulatories. Within these groups separation can be difficult, especially with small specimens.

The only other south-eastern Australian *Pilumnus* is *P. semilanatus* Miers (see Rathbun 1923: Pl. 24, figs. 1-2, Takeda and Miyake 1968: 7-9, Fig. 1a-c, Pl. 1B) which occurs in S. Queensland and S. Australia. This differs from the other six in almost all of the features dealt with in the table: the first anterolateral lobe is rounded and the last two are blunt, all these lobes are covered by numerous small tubercles, the hairs on the carapace are in rows anteriorly, the tubercles on the carapace occur mainly near the front in the midline, where a prominent group covers a pair of postfrontal elevations, the subhepatic region is smooth, the hairs on the outer surface of the palm of the major chela are confined to a small proximal area and do not occur over the dorsal surface, on the minor chela the hairs form a dense mass on the outer surface but both the dorsal and ventral surfaces are smooth and the hairs on the ambulatories form a dense mass on the posterior surface of the propodi as well as along dorsal and ventral edges of all segments.

Heteropilumnus fimbriatus (H. Milne Edwards)

Pilumnus fimbriatus H. Milne Edwards, 1834: 416.
Heteropilumnus fimbriatus; De Man, 1895: 533, 536. Hale, 1927: 168, Fig. 170. (Not *Pilumnus fimbriatus* Haswell, 1882 (= *Cryptocoeloma haswelli* Rathbun, 1923; see Balss 1933: 43).)
Pilumnus pilosus Fulton and Grant, 1906a: 7, Pl. 4, figs. 1-4.

MATERIAL: 5 ♂ ♂, c.w. 5·5-14·6 mm. Survey areas 7 (123) 1, 14 (95) 1, 22 (119) 1, 25 (299) 1, 42 (281) 1.

REMARKS: All specimens possess the very dense fringe of long silky hairs around the front and anterolateral borders, the four low lobes on the anterolateral margin and the smooth carapace typical of this species. In all specimens the outer faces of both chelae are covered by close-set small tubercles. On the minor chela these tubercles usually cover almost the whole of the outer surface of the palm leaving bare only a small area near the articulation of the dactyl. The major chela in most specimens is also densely tuberculate, the tubercles covering at least the proximal half of the outer surface of the palm. In one specimen (♂, c.w. 12·1 mm from Area 42), however, the tubercles on the major chela are restricted to a small proximal area near the articulation with the carpus, the remainder of the outer surface being smooth and bare; the minor chela in this specimen possesses tubercles ventrally and dorsally and the proximal tubercles extend on to the outer face to leave a larger area smooth and naked than in other specimens. Fulton and Grant's type material of *Pilumnus pilosus* (one 'co-type' in Australian Museum, a dry ♂, c.w. 11·3 mm, mounted on glass with printed label 'Cryptocoeloma pilosus Fult. & Grant' and registered as G.5907) resembles the Port Phillip Survey material fairly closely in the granulation of the chelae although the original description does not make this clear.

DISTRIBUTION: S. Australia from Western Port, Vict., through Tasm. to St. Vincent Gulf, S. Aust. Intertidal to 11 fm. Records under this name from tropical Australia and other Indo-pacific localities presumably refer to *Cryptocoeloma haswelli* Rathbun.

Pilumnopeus serratifrons (Kinahan)

Ozius (?) *serratifrons* Kinahan, 1856: 118, Pl. 4, fig. 1.
Heteropanope australiensis Stimpson, 1858: 87; 1907: 64, Pl. 7, fig. 7.
Pilumnopeus crassimanus A. Milne Edwards, 1867: 228.
Pilumnopeus serratifrons; Haswell, 1882: 70, Pl. 2, figs. 1a-b. Balss, 1933: 34 (synon.). Dell, 1968: 19-20, Figs. 1-4 (pleopod 1), Pl. 3.
Heteropanope serratifrons; Hale, 1927: 161, Fig. 162.

MATERIAL: 5 ♂ ♂, 1 ♀ (ovig.), c.w. 16·9-26·9 mm, ovig. ♀ 16·9 mm. Survey areas 27 (Point Wilson intertidal coll. 28 Apr. 62) 1 specimen, 42 (38) 2. Additional material:

Table 1. Comparison of south-western Australian species of *P. lunnis*

Structure	Character	*P. notialis*	*P. subcuneatus*	*P. bullatus*	*P. tumerosus*	*P. gilvus*	*P. simmeriae*	*P. cuniculus*
Anterior lobes	form	short, subcapitiform	short, stout, curved spines	short, stout, cylindriform	moderately long, stout spines; external orbital angle short	long spines; external orbital angle short	moderately long, robust spines	very long, stout spines; hair-spine on external orbital angle
		external orbital angle blunt						
	ornamentation	1-3 tubercles on medial or posterior slopes	1 or 2 tubercles on posterior slopes	none	1-3 spinules on posterior slopes	none	1-3 spinules sometimes in front of behind first two	none
Carapace	hairs	dense mat of short 'clubbed' hairs, especially anteriorly, mixed with rafts of long, stout hairs	dense mat of short 'clubbed' hairs admixed with long hairs	dense mat of 'clubbed' hairs and several rafts of long stout hairs.	moderately long, simple, stout, longer and more numerous anteriorly	very long, simple, covering whole of surface, forming a fringe behind front	moderately long, simple, not especially dense, sparse posteriorly	simple hairs of various lengths, sparse posteriorly, longer and more dense anteriorly; some short 'clubbed' hairs posteriorly
	ornamentation	one main group of 6-12 tubercles in curved row near antero-lateral border; other tubercles near last antero-lateral lobe and anteriorly submedially	several groups of a few tubercles near antero-lateral border, near to last antero-lateral lobe and on gastric regions medially	a few tubercles or spinules near antero-lateral border and submedially anteriorly	a group of 1-3 spines near antero-lateral border and sometimes one or more behind orbits submedially	none; carapace smooth	none; carapace smooth	none; carapace smooth
Front	ornamentation	closely-spaced, small tubercles		closely-spaced tubercles	small tubercles	sometimes with small tubercles	closely-spaced tubercles	about 4 slender spinules on each side, lateral one widely separated from others
Orbits	ornamentation	closely-spaced, blunt tubercles	closely-spaced, pointed tubercles	a few tubercles dorsally near external angle, closely-spaced tubercles ventrally	blunt to pointed tubercles dorsally and ventrally	smooth dorsally, spinules ventrally	stout spinules dorsally and ventrally	unarmed dorsally, ventrally with minute, widely spaced tubercles and one long spine medially
Subhepatic region	ornamentation	a few small tubercles, one or more enlarged		1 or 2 tubercles	a few small spinules	several tubercles and 1-4 spines	several tubercles and spinules	minute spinules and tubercles
Major chela palm - outer surface	hairs	dense mat of short 'clubbed' hairs, ventral $\frac{1}{2}$ or more naked	dense mat of short 'clubbed' hairs mixed with some longer simple hairs dorsally, ventral $\frac{1}{2}$ or more naked	scattered long, simple hairs and dense mat of short 'clubbed' hairs, ventral $\frac{1}{2}$ or more naked	moderately long, simple, stout, more dense dorsally, ventral $\frac{1}{2}$ or less naked	very long, simple, ventral $\frac{1}{2}$ or more naked	moderately long, simple, not especially dense, leaving just more than ventral $\frac{1}{2}$ naked	very long, simple hairs, ventral 2/3 or more naked
	ornamentation	closely-spaced, round, blunt tubercles, ventral $\frac{1}{2}$ or more smooth	closely-spaced, round, blunt tubercles, pointed dorsally, ventral $\frac{1}{2}$ or less smooth	closely-spaced round, blunt tubercles, ventral $\frac{1}{2}$ or more smooth	stout tubercles covering whole surface, blunt ventrally, sharper, longer and less dense dorsally	large, pointed tubercles, dorsal ones sometimes longer and curved, ventral $\frac{1}{2}$ or more smooth	small, closely spaced, stout spines covering almost all of surface, longer and sharper dorsally	closely spaced, stout spines on dorsal $\frac{1}{2}$-2/3, small and blunt towards ventral edge, longer, sharper dorsally
Minor chela palm - outer surface	hairs	dense mat of short 'clubbed' hairs, ventral $\frac{1}{2}$ or more naked	dense mat of short 'clubbed' hairs mixed with some short simple hairs, ventral 1/3 or less naked	scattered long, simple hairs and dense mat of short 'clubbed' hairs, ventral $\frac{1}{2}$ or more naked	moderately long, simple, covering whole of surface, more dense dorsally	sparse, simple, very long dorsally, shorter ventrally, covering whole of surface	moderately long, simple, not especially dense, leaving ventral $\frac{1}{2}$-2/3 naked	very long, simple hairs covering all of surface, generally sparse but more dense dorsally
	ornamentation	closely-spaced, round blunt tubercles, ventral $\frac{1}{2}$ or more smooth	tubercles covering whole of outer surface, pointed dorsally	small blunt tubercles, ventral $\frac{1}{2}$ or less smooth	stout, pointed tubercles more or less in rows, over whole surface, less dense dorsally	tubercles ventrally and spines dorsally more or less in rows, longer and curved dorsally	small, closely spaced, stout spines covering almost all of surface, longer and sharper dorsally	stout spines covering all of surface, longest dorsally
Ambulatory legs	hairs	dense mat of short 'clubbed' hairs dorsally, longer simple hairs dorsally and ventrally	dense mat of short 'clubbed' hairs dorsally, longer simple hairs dorsally and ventrally	dense mat of short 'clubbed' hairs on dorsal and posterior surfaces, long, stout and slender hairs dorsally and ventrally	simple, long, dense dorsally, shorter on posterior and anterior surfaces	very long, simple, straight, longer and more dense dorsally	long, simple, rather sparse	simple hairs on all surfaces of all segments, dorsally longer and more dense
Ambulatory merus	ornamentation	dorsal edge smooth or with a few very low tubercles	dorsal edge with a few curved spinules	smooth or with a few tubercles	sometimes a few spinules dorsally	up to 5 short, curved spines on dorsal edge	a few tubercles dorsally	4 or more spines dorsally, longer distally; some short spinules ventrally
Ambulatory carpus	ornamentation	several blunt tubercles more or less in a double row	several blunt to spiniform tubercles dorsally more or less in double row	small, blunt tubercles dorsally more or less in double row	lacking spines or tubercles	about 3 long, straight or weakly curved spines dorsally	up to 8 long spines dorsally	3 long spines dorsally
Ambulatory propodus	ornamentation					lacking spines or tubercles	about 6 long spines more or less in double row	none

French Is., Western Port, 20 Jan. 63, 3 specimens.

REMARKS: These specimens agree with previously described material in all important features. There are short hairs in clumps around the lateral borders and the sides of the carapace, and also in clumps along the epibranchial and hepatic elevations and in several transverse rows on the protogastric regions near the front. There are a few granules on the carapace in front of the epibranchial elevation and in a curved band parallel to the anterolateral borders and sometimes on the anterolateral lobes and on the posterolateral parts of the carapce. The chelae are minutely granulate dorsally with slightly larger tubercles mid-dorsally along the proximal three-quarters. There are dense fringes of stout hairs along the dorsal and ventral borders of the ambulatory legs.

Dell (1968: 18-19) has reviewed the status of the genus *Pilumnopeus*.

The ovigerous female was taken in January.

DISTRIBUTION: E. and S. Australia from Brisbane River, Qd., through N.S.W. and Vict. to S. Aust. waters (no detailed localities). Intertidal and subtidal. N. New Zealand.

Family GONEPLACIDAE

Litocheira bispinosa Kinahan

Litocheira bispinosa Kinahan, 1856: 121, Pl. 3, fig. 1. McCulloch, 1913: 323-325, Fig. 42. Hale, 1927: 170-171, Fig. 172.

MATERIAL: 88 ♂♂, 76 ♀♀ (9 ovig.), c.w. 2·9-15·9 mm, smallest ovig. ♀ 8·2 mm. Survey areas 5 (51) 2, 6 (67) 1, (137) 1, 7 (123) 1, 9 (178, 180) and 19 (179-180) 14 specimens, 10 (13-15) 6, 11 (190-192) 12, 13 (82-83) 1, (94) 8, 14 (4) 1, 16 (142) 1, (282-283) 6, 17 (170) 1, 18 (307-308) 6, 19 (304) 2, 22 (119) 2, 25 (129) 2, (299) 1, 26 (126) 14, (300-301) 8, (Limeburners Bay intertidal coll. 5 June 63) 1 specimen, 27 (41) 3, 28 (140) 1, (285) 3, (315) 1, 30 (278) 3, 35 (73) 1, 37 (40) 8, (296) 5, 39 (43, 45-46) 9, (314) 16, 40 (101) 6, 42 (108-109) 8, (288) 1, 49 (237) 1, 50 (228) 1, 55 (147) 1, 59 (214) 1, 63 (245) 1, 67 (216) 1, 68 (155) 3, 69 (221) 2. Additional material: Area 42 (Indented Head intertidal coll. 16 Jan. 64) 1 specimen.

REMARKS: Specimens of carapace width about 12 mm or larger have a pair of distinct, transverse, rounded elevations on the anterior part of the branchial regions. There is considerable variation in the shape of the external orbital angle (though usually blunt it is sometimes spinous), the shape of the anterolateral spine (usually acute but sometimes rounded and blunt) and the size of the proximal tooth on the dactyl of the major chela. There is a reasonable amount of long scattered hair along the dorsolateral part of the carapace and on the chelipeds and ambulatories in all medium-sized (c. 9 mm c.w.) and larger specimens.

Hale (1927: 170-171) states, 'During life the carapace of this . . . species is mottled with purplish brown, and the walking legs are irregularly banded with the same colour'. The present series of specimens show this colour pattern very clearly.

This species is easily distinguished from *L. glabra* Baker, from S. Australia, apparently known only from the holotype, a female, by the double-ridged, or grooved, frontal margin, presence of an anterolateral spine on the carapace and differences in shape of the suborbital border, third maxillipeds and chela.

Ovigerous females were collected in March, June, August and November.

DISTRIBUTION: S. Australia from Hobart, Tasm. and Western Port, Vict., through S. Aust. to Albany area, SW. Western Australia. Subtidal to 15 fm. Unconfirmed records from Port Curtis, Qd., Torres Strait and Fiji.

Family PINNOTHERIDAE

Pinnotheres pisum (Pennant)

Cancer pisum Pennant, 1777: 1, Pl. 1, fig. 1.
Pinnotheres pisum; Bouvier, 1940: 301-302, Fig. 187. Scott, 1961: 303-309, Figs. 2-3, 5.

MATERIAL: 6 ♂♂, 25 ♀♀ (2 ovig.), c.w. 4·3-12·0 mm, smaller ovig. ♀ 8·8 mm. Survey areas 5 (58) 3, (165-166, 168-169) 2 specimens, 6 (64) 4, 7 (208) 1, 13 (82) 1, 14 (95) 11, 42 (108) 2, 63 (159-162) 1. All specimens were from *Mytilus planulatus*. Additional material: Areas 63-70, Dromana, in cast up *Eumarcia fumigata*, June 1962, 1 specimen; Port Phillip, from *Mytilus planulatus*, 7 fm,

I. D. Hiscock, 1967 (A.M. P.15608) 5 specimens.

REMARKS: All the adult (soft shelled) females in this series possess a dactyl on the third maxilliped which arises from the proximal part of the propodus, the fused ischiomerus bears hairs along the distal part but sometimes along the whole of the lateral margin, the palm of the chela is longer than high, stoutest distally, the dactyl of the chela bears a strong proximal tooth on the inner margin and the fixed finger bears a low, broad, acute tooth about midway along the inner edge, the ambulatory legs are slender and the last bears a thick fringe of plumose hairs on the dorsal edge of the merus and scattered short hairs on the ventral edge of the merus and on both dorsal and ventral edges of the carpus and propodus. The mandible of one specimen was examined and this possesses an uneven medial edge with about three lobes or teeth close to the incisor provess. This material is therefore clearly referable to *P. Pisum* and agrees well with the figures given by Bouvier 1940 and to a lesser extent with the figures and remarks provided by Scott 1961. Our material differs from that discussed by Scott in that the chela is slightly stouter, the lateral margin of the ischiomerus is often fringed with hairs along its entire length (these are not especially dense) and a thick fringe of plumose hairs occurs only on the dorsal edge of the merus of the last leg, not on both edges of merus, carpus and propodus as stated by Scott (1961: 305).

Our material also agrees in essential features with specimens studied by the late F. E. Grant (in ms notes) and compared with specimens of *P. pisum* in the British Museum (Nat. Hist.). According to the late A. R. McCulloch (in ms notes), however, Grant's material agreed with specimens from the type series of *Pinnotheres subglobosa* Baker. We have compared these two series (Grant's material and 'co-types' of *P. subglobosa*, both in Australian Museum) and find that Baker's specimens differ from *P. pisum* in lacking a dactyl on the third maxilliped and in the shape of the palm of the chela and in the ornamentation of the fingers—the palm is very much longer than high and of almost even height throughout, the tooth on the dactyl is slender and acute and the fixed finger bears two broad triangular teeth which closely flank the tooth on the dactyl when the fingers are closed.

Rathbun (1923: 98) identified one female specimen from Bass Strait as *Pinnotheres novaezelandiae*. Re-examination of this specimen enables us to confirm that the orbits do extend laterally beyond the eyes for a distance equal to the length of the eyestalks as a shallow groove whereas in our specimens of *P. pisum* the orbits extend only a very short distance beyond the eyestalks; in Rathbun's specimen the dactyls of the ambulatories are fringed with hairs. The specimen is not referable to *P. pisum* and Scott (1961: 308) considered that it was probably not *P. novaezelandiae*.

The ovigerous females were taken in March.

DISTRIBUTION: SE. Australia, from Victorian waters, free-living or commensal in bivalve molluscs of the genera *Mytilus, Modiolus* and *Eumarcia*. Intertidal to 10 fm. NE. Atlantic and Mediterranenan.

Family GRAPSIDAE

Leptograpsus variegatus (Fabricius)

Cancer variegatus Fabricius, 1793: 450.
Leptograpsus variegatus; Rathbun, 1918: 234-235, Pl. 56. Hale, 1927: 180-181, Fig. 181. Bennett, 1964: 80.

MATERIAL: 1 ♂, c.w. 60·0 mm. Portland Pier Survey: Portland rock platform, J. E. Watson, 25 June 63, 1 specimen.

REMARKS: This large male constitutes one of the few records of this species from the Victorian coast.

DISTRIBUTION: E., S. and W. Australia from Rockhampton, Qd., through N.S.W., Vict., Tasm. and S. Aust. to Shark Bay, W. Aust. Intertidal to a depth recorded as '3-4 fm'. Middleton Reef, Norfolk and Lord Howe Islands, Tasman Sea; Kermadec Islands; N. and central New Zealand; Easter Is. and Juan Fernandez, SE. Pacific; Peru and Chile, W. South America.

Cyclograpsus audouinii H. Milne Edwards

Cyclograpsus Audouinii H. Milne Edwards, 1837: 78.
Cyclograpsus audouinii; Hale, 1927: 176-177, Fig. 176. Campbell and Griffin, 1966: 150-152, Figs. 3A, 6A; Pl. 21, figs. 1-2; Pl. 23, figs. 5-6.

MATERIAL: 1 ♀, c.w. 14·5 mm. Survey area 14 (Beaumaris shore coll. 3-6 ft, 11 Jan. 61) 1 specimen.

REMARKS: In the extensive felting of the ambulatories, particularly on the first and last legs, the uniformly convex lateral margins and bilobate front, this specimen clearly agrees with the large series of specimens of *C. audouinii* examined by Campbell and Griffin (1966). The related *C. granulosus* is the species usually found in Victoria.

DISTRIBUTION: E., S. and W. Aust. from Elliott River mouth, just S. of Bundaberg, Qd., through N.S.W., Vict. (this is the first definite record from Victoria) and S. Aust. to Shark Bay, W. Aust. Supralittoral and intertidal to a depth recorded as '3-4' fm'. Unconfirmed record from New Guinea.

Paragrapsus quadridentatus (H. Milne Edwards)

Cyclograpsus quadridentatus H. Milne Edwards, 1837: 79.
Paragrapsus quadridentatus; Campbell and Griffin, 1966: 160-161, Figs. 8A, 10A; Pl. 22, fig. 1; Pl. 23, fig. 9.

MATERIAL: 10 ♂♂, 7 ♀♀, c.w. 4·4-22·3 mm. Survey areas 6 (118) 1, 10 (103) 1, 17 (170) 5, 40 (101) 2, 55 (35) 1, (39) 1, (off Schnapper Point intertidal coll. under stones 12 Mar. 62) 6 specimens.

REMARKS: These specimens, mostly small, are clearly conspecific with those examined by Campbell and Griffin (1966). In all specimens the reddish spots on the carapace are distinct and more numerous anteriorly.

DISTRIBUTION: SE. Australia, from Wilsons Promontory to Lady Bay, Warrnambool (Vict.), and Tasm. Intertidal to 5 fm.

Paragrapsus gaimardii (H. Milne Edwards)

Cyclograpsus gaimardii H. Milne Edwards, 1837: 79.
Paragrapsus gaimardii; Hale, 1927: 179-180, Fig. 180. Campbell and Griffin, 1966: 164-165, Figs. 9A, 10B; Pl. 22, fig. 3; Pl. 23, fig. 11.

MATERIAL: 6♂♂, 4♀♀ (1 ovig.), c.w. 4·9-25·2 mm, ovig. ♀ 25·2 mm. Survey areas 9 (84) 1, 25 (129) 4, 37 (40) 2, 58 (89) 2. Additional material: French Is., Western Port, 20 Jan. 1963, 1 specimen.

REMARKS: All the specimens are pale in colour with the felting on the ambulatories agreeing with that typical for the species (see Campbell and Griffin 1966); further, in the males the penultimate segment of the abdomen is very broad and the first sternite is at a different level from the second.

The ovigerous female was collected in August.

DISTRIBUTION: SE. and S. Australia from Wilsons Promontory, Vict., through Tasm. to Kangaroo Is. and the Coorong Channel, Murray River mouth, S. Aust. Supralittoral and intertidal to 6 fm.

Family MICTYRIDAE

Mictyris platycheles H. Milne Edwards

Mictyris platycheles H. Milne Edwards, 1852: 154. McNeill, 1926: 123-128, Fig. 4; Pl. 10, figs. 3-4.

MATERIAL: 5 ♂♂, c.l. 14·7-16·7 mm. Survey area 5 (Altona on muddy sandbanks at low tide 19 June 62), 2 specimens. Additional material: French Is., Western Port, 20 Jan. 63, 3 specimens.

REMARKS: The five males are clearly referable to this species by their possession of large whitish tubercles on the central parts of the carapace, branchial regions and third maxillipeds and of a large tooth on the inner edge of the dactyl of the chela.

DISTRIBUTION: E. and SE. Australia from Moreton Bay, Qd., through N.S.W. to Port Phillip, Vict., and Tasm. Intertidal.

Discussion

Zoogeographic Relationships. All but two of the 31 species discussed in this report have been previously recorded from Victoria, although *Leptograpsus variegatus* was generally known from islands off the coast rather than from the mainland (see Bennett and Pope 1953) and previous records of *Cyclograpsus audouinii* from Victoria are doubtful (Campbell and Griffin 1966). The following two species have not previously been recorded from Victoria: *Pilumnus acer* (taken by the Port Phillip Survey) and *Paratymolus latipes* (from the Portland Pier Survey). The following three species, not listed by Fulton and Grant as occurring in Port Phillip, have been taken by the Survey: *Naxia aurita, Notomithrax minor* and *Paragrapsus quadridentatus. N. aurita* was recorded by

Kinahan (1856) from Port Phillip and this record was repeated by McCulloch (1913: 327) and by Balss (1935). *N. minor* was recorded (as *Paramithrax peronii*) by Fulton and Grant (1906) and by Kershaw (1906) from Wilsons Promontory and was stated by Ward (as *P. minor*) to occur in Port Phillip. *P. quadridentatus* was listed by Fulton and Grant as occurring on the Victorian coast and Bass Strait islands and by Ward as occurring in Port Phillip.

The following 14 species from Port Phillip recorded by Fulton and Gray were not represented in the collections available to us for the purpose of this report (current names given only): *Merocryptus lambriformis, Halicarcinus australis, Naxia spinosa, Paramithrax barbicornis, Huenia bifurcata, Leptomithrax sternocostulatus, Micippa tuberculosa, Tumulosternum longimanus, Pseudocarcinus gigas, Macropipus corrugatus, Helograpsus haswellianus, Paragrapsus laevis, Brachynotus spinosus, Cyclograpsus granulosus* and *Macrophthalmus latifrons*. The following three species, not listed by Fulton and Grant as occurring at Port Phillip, but discussed by Ward (1929), were not taken by the Port Phillip Survey: *Petalomera lamellata, Nectocarcinus tuberculosus* and *Heloecius cordiformis*.

All the species taken by the Survey are thus well known, cool temperate species recorded from other areas in SE. Australia and in a few cases from central E. or SW. Australia.

Ecological Distribution. Of the 1120 specimens which make up the collection 10 species account for 955 specimens. These are as follows (number of specimens in brackets): *Halicarcinus ovatus* (279), *Litocheira bispinosa* (90), *Pilumnus monilifer* (77), *Pilumnus tomentosus* (50), *Halicarcinus rostratus* (42), *Nectocarcinus integrifrons* (37), *Carcinus maenas* (31) and *Pinnotheres pisum* (31). No other species is represented by more than 20 specimens.

Almost all species occur in the shallower parts around the edge of the Bay, especially in the W. part, although not all extend into the Geelong Harbour-Corio Bay area. *Notomithrax minor, Halicarcinus ovatus, Pilumnus tomentosus* and *Litocheira bispinosa* are widespread species in the Bay, distributed around the shallower areas where sand makes up the dominant fraction of the bottom sediment (Beasley 1966). *N. minor, P. tomentosus* and *P. monilifer* were frequently taken in areas where silt is common and *Caulerpa* and *Zostera* occur (Willis 1966); *H. rostratus* occurs in deeper water than *H. ovatus* and where clay is sometimes mixed with the other fractions. *L. bispinosa* also occurs in areas where silt and clay from a significant proportion of the substrate. *Ebalia* (*Phlyxia*) *intermedia, Philyra laevis, Naxia aurita, Leptomithrax gaimardii, Nectocarcinus integrifrons* and *Carcinus maenas* appear to occur more frequently in areas where *Caulerpa* and *Zostera* cover the bottom. A small group of species, *Naxia deflexifrons, Naxia tumida, Pilumnus acer* and *P. etheridgei* occur mainly near the Port Phillip Heads region where the majority of algal species occur (Womersley 1966). No species is found in the centre of the Bay where clay and silty clay occur at depths exceeding 10 fm. The reason does not lie solely with the type of substrate since several species are found in the Geelong Harbour area where silty clay forms the dominant fraction.

The Portland Pier Survey took seven species of crabs: *Petalomera wilsoni, Halicarcinus ovatus, Paratymolus latipes, Leptomithrax gaimardii, Nectocarcinus integrifrons, Pilumnus acer* and *Actaea peronii*. The larger specimens of *L. gaimardii* represent part of a very large swarm of this species, the formation of which is possibly related to breeding or moulting (see Lynch 1961). Of these seven, five species (*P. wilsoni, P. latipes, N. integrifrons, P. acer* and *A. peronii*) were associated only with Bryozoa; *H. ovatus* was associated with ascidiand in greater numbers (18 specimens) than with Bryozoa (3). One specimen of *Leptograpsus variegatus* was taken on a rock platform at Portland. Only four species (*Philyra laevis, Pilumnopeus serratifrons, Paragrapsus gaimardii* and *Mictyris platycheles* were collected at Western Port.

Breeding. The available information suggests that in *Halicarcinus ovatus* ovigerous females occur in greater numbers in summer, although breeding appears to take place throughout the year (see Table 2). A similar pattern appears

to exist in *Notomithrax minor*. Ovigerous females of *Dromidiopsis excavata* (Sept.), *Ebalia (Phlyxia) intermedia* (Mar.), *Philyra undecimspinosa* (Mar.), *Halicarcinus rostratus* (Dec., Feb. through Apr., June, July), *Naxia tumida* (May), *Pinnotheres pisum* (Mar.), *Nectocarcinus integrifrons* (Mar., Oct.), *Litocheira bispinosa* (Mar., June, Aug., Nov.), *Paragrapsus gaimardii* (Aug.), *P. monilifer* (June, Sept.), *P. acer* (Dec.), and *Pilumnopeus serratifrons* (Jan.) were also collected but the data are inadequate for the purpose of any useful generalization about temporal patterns in breeding.

TABLE 2

Frequency of occurrence (expressed as percentage of total number of females) of ovigerous females of two species of crabs taken by Port Phillip Survey 1959-63.

	Halicarcinus ovatus		*Notomithrax minor*	
Month	% ovig.	Total females	% ovig.	Total females
Jan.	47·8	23	33.3	6
Feb.	40·0	5	0	1
Mar.	41.6	24	65·3	26
Apr.	16·6	4	55·5	18
May	8·3	12	42·8	7
June	12·5	24	—	—
July	—	—	60.0	5
Aug.	63·6	11	0	1
Sept.	66·6	3	—	—
Oct.	100	6	62·5	8
Nov.	100	1	100	1
Dec.	—	—	50·0	2

Parasitism. In two species of *Pilumnus*—*P. tomentosus* and *P. monilifera*—a small number of specimens were infested with sacculinas.

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References

BAKER, W. H., 1906. Notes on South Australian decapod Crustacea, Pt 4. *Trans. R. Soc. S. Aust.* 30: 104-117.

BALSS, H., 1932. Über einige systematisch intressante Xanthidae (Crustacea Decapoda Bracyura) der Harmsschen Reisen nach dem Sundaarchipel. *Z. wiss. Zool.* 142: 510-519.

————, 1933. Beiträge zur Kenntnis der gattung *Pilumnus* (Crustacea Dekapoda) und verwandter gattungen. *Capita Zool.* 4 (3): 1-47.

————, 1935. Brachyura of the Hamburg Museum Expedition to south-western Australia, 1905. *J. Proc. R. Soc. West. Aust,* 21: 113-151.

BEASLEY, A. W., 1966. Port Phillip Survey 1957-1963. Bottom sediments. *Mem. natn. Mus. Vict.* 27: 69-105.

BELL, T. 1855. Horae Carcinologicae, or Notices of Crustacea. I. A monograph of the Leucosiadae, with observations on the relations, structure, habits and distribution of the family; a revision of the generic characters; and descriptions of new genera and species. *Trans. Linn Soc. Lond. (Zool.)* 21: 277-314.

BENNETT, E. W., 1964. The marine fauna of New Zealand: Crustacea Bracyura. *Bull. N.Z. Dep. scient. ind. Res.* 153: 1-120.

BENNETT, ISOBEL, and POPE, ELIZABETH, C., 1953. Intertidal zonation of the exposed rocky shores of Victoria, together with a rearrangement of the biogeographical provinces of temperate Australian shores. *Aust. J. mar. Freshwat. Res.* 4: 105-159.

BOUVIER, E. L., 1940. Décapodes Marcheurs. In *Faune de France* 37. Paris. Pp. 404.

CALMAN, W. T., 1900. On a collection of Brachyura from Torres Straits. *Trans. Linn. Soc. Lond. (Zool.)* ser. 2, 8: 1-50.

CAMPBELL, B. M., and GRIFFIN, D. J. G., 1966. The Australian Sesarminae (Crustacea; Brachyura): genera *Helice, Helograpsus* nov., *Cyclograpsus* and *Paragrapsus. Mem. Qd Mus.* 14: 127-174.

DANA, J. D., 1852. Crustacea. In *U.S. Exploring Expedition during the years 1838-1842 under the command of Charles Wilkes, U.S.N.* 13. Philadelphia, Pp. viii + 1618. Atlas (1855): 1-27.

DELL, R. K., 1968. Notes on New Zealand crabs. *Rec. Dom. Mus., Wellington* 6: 13-28.

FABRICIUS, J. C., 1793. *Entomologica systemica emendata et acuta, Secundum classes, ordines, genera, species, adjectis synonymis, locis, observationibus, descriptionibus.* Vol. 2: viii + 519.

FILHOL, H., 1885. Considerations Rélatives à la Faune des Crustacés de la Nouvelle-Zélande. *Bibltque Ec. ht. Etud., Paris Select. Sci. nat.* 30: 1-60.

————, 1886. Catalogue des Crustacés de la Nouvelle-Zélande, des îles Auckland et Campbell. In *Mission de l'Ile Campbell,* Zool. 3 (2): 349-510; 3 (4). Atlas. Paris.

FULTON, S. W., and GRANT, F. E., 1902. Some little known Victorian decapod Crustacea with descriptions of new species, No. 2. *Proc. R. Soc. Vict.* 15: 59-68.

————, 1906a. Some little known Victorian decapod Crustacea, with descriptions of new species. No. 3. *Proc. R. Soc. Vict.* 19: 5-14.

————, 1906b. Census of the Victorian decapod Crustacea. Part 1 (Brachyura). *Proc. R. Soc. Vict.* 19: 16-20.

GRAY, J. E., 1831. *Zoological Miscellany,* no. 1 (February 1831): 40. London.

GRIFFIN, D. J. G., 1963. Redescriptions of the Australian majid spider crabs *Leptomithrax gaimardii* (H. Milne Edwards) and *Paramithrax barbicornis* (Latreille). *Rec. Aust. Mus.* 26: 131-143.

————, 1966. The marine fauna of New Zealand: spider crabs, family Majidae. *Bull. N.Z. Dep. scient. ind. Res.* 172: 1-111.

————, 1970. The status of *Pilumnus terrareginae* Haswell (Crustacea, Decapoda, Xanthidae) and a new giant *Pilumnus* from Queensland Waters. *Mem. Qd Mus.* 15: 323-330.

————, in press. Dr Th. Mortensen's Pacific Expedition 1914-16. Crustacea Brachyura from eastern and southern Australia. *Steenstrupia.*

HALE, H. M., 1927. *The crustaceans of South Australia* 1: 1-201. Adelaide.

HASWELL, W. A., 1880a. On two new species of the genus *Paratymolus* Miers from Australia. *Ann. Mag. nat. Hist.* (ser. 5) 5: 302-304.

————, 1880b. On the Australian Bracyura Oxyrhyncha. *Proc. Linn. Soc. N.S.W.* 4: 431-458.

————, 1881. On some new Australian Brachyura. *Proc. Linn. Soc. N.S.W.* 6: 540-551.

————, 1882. *Catalogue of the Australian Stalk- and Sessile-eyed Crustacea.* Sydney. Pp. XXIV+ 326.

HENDERSON, J. R., 1893. A contribution to Indian carcinology. *Trans. Linn. Soc. Lond. (Zool.)* ser. 2, 5: 325-458.

HESS, W., 1865. Beiträge zur Kenntniss der Decapoden-Krebse Öst-Australiens. *Arch. Naturgesch.* 31: 127-173.

KEMP, S., 1917. Notes on Crustacea Decapoda in the Indian Museum. X. Hymenosomatidae. *Rec. Indian Mus.* 13: 243-279.

KERSHAW, J. A., 1906. Crustacea. In A. D. Hardy, Excursion to Wilson's Promontory. *Victorian Naturalist* 22: 205-207.

KINAHAN, J. R., 1856. Remarks on the habits and distribution of marine Crustacea on the eastern shores of Port Phillip, Victoria, Australia; with descriptions of undescribed species and genera. *Jl R. Dubl. Soc.* 1: 111-134.

LATREILLE, P. A., 1825. *Encyclopedie Methodique Entomologie, ou Histoire Naturelle des Crustacés, des Arachnides et des Insectes.* Vol 10, 832 pp. Paris.

LINNAEUS, C., 1758. *Systema Naturae Per Regna Tria Naturel, Secundum classes, Ordines, Genera, Species, Cum charactibus, Differentiis, Synonymis, Locis—Holmiae: L. Salvii.* Tenth edition. Vol 1: 824 + iii.

LYNCH, D. D., 1961. Large numbers of great spider crabs in Port Phillip Bay. *Fish. Wildl. Dep. Victoria News.* No. 39: 12-13.

MCCULLOCH, A. R., 1913. Studies in Australian Crustacea, No. 3. *Rec. Aust. Mus.* 9: 321-353.

MCNEILL, F. A., 1926. Studies in Australian carinology. No. 2. (A revision of the family Mictyridae and the status and synonymy of the genus *Megametope*, and its contained species.) *Rec. Aust. Mus.* 15: 100-131.

MACPHERSON, J. HOPE, and LYNCH, D. D., 1966. Port Phillip Survey 1957-1963. Introduction. *Mem. natn. Mus. Vict.* 27: 1-5.

MAN, J. G. DE, 1895. Bericht über die von Herrn Schiffscaptitän Storm zu Atjeh an den westlichen Kusten von Malakka, Borneo und Celebes sowie in der Java-See gesammelten Decapoden und Stomatopoden, 1. *Zool. Jb. Syst.* 8: 485-610.

MIERS, E. J., 1886. Report on the Brachyura collected by H.M.S. "Challenger" duirng the years 1873-1876. *Rep. Voy. "Challenger" Zool.* 17 (2): 1-362, Pls. 1-29. London.

MILNE EDWARDS, A., 1861. Etudes zoologiques sur les Crustacés récents de la famille des Portuniens. *Archs. Mus. natn. Hist. nat., Paris* 10: 309-428.

————, 1867. Description de quelques espèces nouvelles de Crustacés Brachyures. *Annls. Soc. ent. France* sér 4, 7: 263-288.

MILNE EDWARDS, H., 1834. *Histoire naturelle des Crustacés, comprenant l'anatomie, la psyiologie et la classification de ces animaux 1:* XXV + 468. Atlas. Paris.

————, 1837. *Histoire naturelle des Crustacés, comprenant l'anatomie, la physiologie et la classification de ces animaux,* 2. 531 pp. Atlas. Paris.

————, 1852. Observations sur les affinités zoologiques et la classification naturelle des Crustacés. *Annal Sci. nat. (Zool)* 3 (18): 109-166.

ODHNER, T., 1925. Monographierte gattungen der Krabbenfamilie Xanthidae, 1. *Goteborgs K. Vetensk -o. Vitterh Samh. Handl.* 4 (29): 1-92.

PENNANT, T., 1777. *British Zoology.* 4th ed., Vol. 4, i + 136 pp. Warrington (quoted from Stephenson and Campbell, 1960).

RATHBUN, MARY J., 1918. The grapsoid crabs of America. *Bull. U.S. natn. Mus.* 97: XXII + 461 pp.

————, 1923. Report on the crabs obtained by the F.I.S. "Endeavour" on the coasts of Queensland, New South Wales, Victoria, South Australia and Tasmania. *Biol. Res. "Endeavour" 1909-1914.* 5: 93-156.

SAYCE, O. A., 1902. Dredging in Port Phillip. *Victorian Nat.* 18: 149-155.

SCOTT, M. S., 1961. A review of the New Zealand Pinnotheridae. *Trans. R. Soc. N.Z., Zool.* 1: 303-309.

STEBBING, T. R. R., 1900. On some crustaceans from the Falkland Islands, collected by Mr Rupert Vallentin. *Proc. zool. Soc. Lond.* 1900: 517-568.

STEPHENSON, W., and CAMPBELL, B. M., 1960. The Australian portunids (Crustacea: Portunidae). IV. Remaining genera. *Aust. J. mar. Freshwat. Res.* 11: 73-122.

STEPHENSON, W., and REES, May, 1968. A revision of of the genus *Ovalipes* Rathbun, 1898 (Crustacea, Decapoda, Portunidae). *Rec. Aust. Mus.* 27: 213-261.

STIMPSON, W., 1858. Prodromus descriptionis animalium evertebratorum, que in Expeditione ad Oceanum Pacificum Septentrionalem, a Republica Federata Missa, C. Ringgold et J. Rodgers ducibus observavit et descripsit. Pars 7. Crustacea Anomura. *Proc. Acad. nat. Sci. Philad.* 1858: 225-252.

————, 1907. Report on the Crustacea (Brachyura and Anomura) collected by the North Pacific Exploring Expedition. *Smithson. misc. Collns* 49 (1717): 1-240.

TAKEDA, M., and MIYAKE, S., 1958. Pilumnid crabs of the family Xanthidae from the West Pacific. I. Twenty-three species of the genus *Pilummus,* with description of four new species. *Ohmu* 1: 1-60, 13 figs.

TYNDALE-BISCOE, MARINA and GEORGE, R. W., 1962. The Oxystomata and Gymnopleura (Crustacea, Brachyura) of Western Australia with descriptions of two new species from Western Australia and one from India. *J. Proc. R. Soc. West. Aust.* 45: 65-96.

WARD, M., 1929. Common shore crabs of Port Phillip. *Victorian Nat.* 46: 75-83.

WEAR, R. G., 1967. Life history studies on New Zealand Brachyura. 1. Embryonic and post-embryonic development of *Pilumnus novaezealandiae* Filhol, 1886, and of *P. lumpinus* Bennett, 1964 (Xanthidae, Pilumninae). *N.Z. Jl mar. Freshwat. Res.* 1: 482-535.

WHITELEGGE, T., 1900. Scientific results of the trawling expedition of H.M.C.S. "Thetis" off the coast of New South Wales, in February and March, 1898. Crustacea. Part 1. *Mem. Aust. Mus.* 4: 135-199.

WILLIS, J. H., 1966. Port Phillip Survey 1957-1963. Vegetation. *Mem. natn. Mus. Vict.* 27: 119-130.

WOMERSLEY, H. B. S., 1966. Port Phillip Survey 1957-1963. Algae. *Mem. natn. mus. Vict.* 27: 133-156.

6

BRYOZOA

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Abstract

The survey collections contained 114 species which are discussed; 95 of these are determined to species level, and the remaining 19 have been placed in their appropriate genera. Appended is a list of the 300 species with their localities recorded by MacGillivray in his monograph; 153 of these are recorded from Port Phillip Heads, and 78 of them were taken on the present Survey.

Introduction

The Bryozoa of the original Port Phillip Survey set up by the Royal Society of Victoria in July 1888 were included in P. H. MacGillivray's monograph of the Victoria Bryozoa published in McCoy's Prodromus of Zoology 1879-89. Port Phillip Heads is a locality listed for 153 of the 300 species discussed, and is the only one for 125 of these species; 81 species are listed for Queenscliff, 42 for Portland and 22 for Warrnambool, W. Victoria.

The present Survey Bryozoan collections have been worked in detail, and it has been possible to identify 95 species, while a further 19 have been identified to genus level only. These are discussed in the present paper. A table of the species discussed by MacGillivray in McCoy's Prodromus of Zoology is included together with their authors, dates, currently accepted nomenclature, and localities as listed in the Prodromus. The 78 species collected in this survey are marked with an asterisk.

Last century Bryozoologists proposed several new families, genera and species. However, Professor Raymond C. Osburn 1952: 284) frankly admitted that where to place several species still puzzled him greatly. He quoted Shakespeare, 'They fool me to the top of my bent', and continued '*The Lichenopores* have always been "a thorn in the flesh" to those who have attempted to work with them.' Likewise several times in this study the question arose as to whether one genus is congeneric with another. In several species a great deal of variation in most of the characters has been recorded. One species may resemble another species from the coast of Europe, so transfer by ship cannot be excluded.

It is necessary that the Bryozoan collections in the National Museum of Victoria be revised. They have been put in order recently both systematically and alphabetically, but not revised.

Subphylum ECTOPROCTA Nitsche, 1869
Class GYMNOLAEMATA Allman, 1856
Order CTENOSTOMATA Busk, 1852
Suborder CARNOSA Gray, 1841
Family FLUSTRELLIDRIDAE Bassler, 1953
Elzerina Lamouroux, 1816
Elzerina blainvilii Lamouroux, 1816

Elzerina blainvilii Lamouroux, 1816: 123, Pl. 2, figs. 3a-b.
Farciminaria dichotoma Busk, 1861: 155, Pl. 35, figs. 1-1b.
Flustrella dichotoma Hincks, 1884: 366, Pl. 14, figs. 2-2b.
Verrucularia dichotoma Busk, 1884: 48.
Verrucularia dichotoma, MacGillivray, 1890: 348-349, figs. 6-7a.

Survey area 58 (88), 59 (36), MacGill. Coll. area 58 Port Phillip Heads

Suborder VESICULARINA Johnston, 1847
Family VESICULARIIDAE Hincks, 1880
Bowerbankia Farre, 1837
Bowerbankia sp.

Survey area 10 (103-5).

Growing on *Mytilus planulatus* in association with *Membranipora papulifera, Bugula neritina* and *Celleporella hyalina.*

Amathia Lamouroux, 1812

This genus is well represented on the Australian coast.

Amathia australis (Tenison-Woods, 1878)

Serialaria australis Tenison-Woods, 1878: 83, plate.
Amathia australis, MacGill., 1889A: 310, Pl. 185, figs. 5-5a.

Survey area 59 (225), MacGill. Coll. area 58 Port Phillip Heads.

? **Amathia biseriata** Krauss, 1837

Amathia biseriata Krauss, 1837: 23.

Survey area 59 (36).

Amathia inarmata MacGill., 1887

Amathia inarmata MacGill. 1887A: 184, 1889A: 309, Pl. 185, figs. 4-4a.

Survey Area 60 (215), 61 (242), MacGill. Coll. area 58 Port Phillip Heads.

Amathia tortuosa Tenison-Woods, 1880

Amathia tortuosa MacGill., 1889A: 308, Pl. 185, figs. 3-3a.

Survey area 10 (193), 11 (212), 12 (196), 13 (210), 25 (299), 37 (297-8), MacGill. Coll. area 58 Port Phillip Heads.

Amathia sp.

Survey areas 59 (87), 61 (241).

Order CYCLOSTOMATA Busk, 1852
Suborder ARTICULATA Busk, 1859
Family CRISIIDAE Johnston, 1847
Crisia Lamouroux, 1812

Crisia acropora Busk, 1852

Crisia acropora Busk, 1852: 351; 1875: 6, Pl. 5, figs. 3-4, MacGillivray, 1879A: 38-39, Pl. 39, figs. 3-3c.

Survey areas 58 (150-4), (290), 59 (36), 66 (291-2), MacGill. Coll. areas 6 Williamstown, 58 Queenscliff,

Crisia edwardsiana (d'Orbigny, 1839)

Crisia edwardsiana, d'Orbigny, 1839: 7, Pl. 1, figs. 4-8.
Crisia edwardsiana, Busk, 1875: 5, Pl. 2, figs. 5-8; MacGillivray, 1879A: 37, Pl. 39, figs. 2-2c.

Survey area 58 (290), 66 (291-2), MacGill. Coll. area 6 Williamstown.

Crisia tenuis MacGill., 1879

Crisia tenuis MacGill., 1879A: 39-40, Pl. 39, figs. 5-5d.

Survey area 59 (24), MacGill. Coll. area 59 Queenscliff, growing on roots of algae. Growing on *Celleporaria prolifera* in association with *Conopeum reticulum, Bugula dentata* and *Scrupocellaria diadema.*

Crisia geniculata (Milne-Edwards, 1838)

Crisia geniculata Milne-Edwards, 1838: 197, Pl. 6, figs. 1-1c.
Crisida cornuta var. *geniculata* Busk, 1875: 3, Pl. 1, figs. 1-4.

Survey area 59 (36).

Crisia sp.

Survey area 58 (88) (150-4), 59 (36) (79).

Suborder TUBULIPORINA Milne-Edwards, 1838
Family DIASTOPORIDAE Gregory, 1899
Berenicea Lamouroux, 1821

? **Berenicea sarniensis** (Norman, 1864)

Diastopora sarniensis Norman, 1864: 89, Pl. 11, figs. 4-6; MacGillivray, 1887: 181, Pl. 147, figs. 4-4b.
Plagioecia sarniensis: Osburn, 1953: 632, Pl. 73, fig. 3.

Survey area 57 (294), MacGill. Coll. area 58 Port Phillip Heads.

'There is much resemblance to *P. patina* in the zoarial form . . . *P. sarniensis* has now been found in so many parts of the world that its distribution must be considered cosmopolitan' (Osburn 1953: 623-633). MacGillivray (1887C) lists both *Diastopora sarniensis* (Norman) and *Diastopora patina* (Lamarck) from Port Phillip Heads.

Family ONCOUSOECIIDAE Canu, 1918
Stomatoporoa Bronn, 1825

? **Stomatopora geminata**, MacGill., 1886

Stomatopora geminata MacGill., 1886: 2, Pl. 2, fig. 3; 1889: 279, Pl. 176, fig. 1.

Survey areas 58 (150-4), 59 (36), MacGill. Coll. area 59 Port Phillip Heads.

Family TUBULIPORIDAE Johnston, 1838
Idmidronea Canu and Bassler, 1920

? **Idmidronea australis** (MacGill., 1884)

Idmonea australis McGill., 1884: 30, Pl. 68, figs. 2-2b.

Survey area 58 (150-4), MacGill. Coll. area 58 Port Phillip Heads.

'This species may prove to be a form of *I. atlantica*, but at present I think it better to describe it as a distinct species' (MacGillivray 1884: 30). 'It appears to me quite distinct' (Harmer 1915: 125).

Suborder CANCELLATA Gregory, 1896
Family HORNERIDAE Smitt, 1867
Hornera Lamouroux, 1821

Hornera foliacea MacGill., 1869

Hornera foliacea MacGill., 1869: 143; 1886: 71-72, Pl. 118, figs. 1-5.

Survey area 59 (36), MacGill. Coll. area 58 Port Phillip Heads.

Hornera sp.

Survey areas 59 (36), 60 (268).

Suborder RECTANGULATA Waters, 1887

Family LICHENOPORIDAE Smitt, 1887

Lichenopora Defrance, 1823

Lichenopora sp.

Survey area 66 (292).

MacGillivray (1889: 280-281) lists two species for Victoria, both of which were taken in the vicinity of Port Phillip Heads (Area 58).

Order CHEILOSTOMATA Busk, 1852

Suborder ANASCA Levinsen, 1909

Division INOVICELLATA Jullien, 1888

Family AETEIDAE Smitt, 1867

Aetea Lamouroux, 1812

Aetea anguina (Linnaeus, 1758)

Sertularia anguina Linnaeus, 1758: 816.
Aetea anguina, MacGillivray, 1887B: 143, Pl. 137, figs. 7-7a.

Survey area 58 (88), 59 (36), MacGill. Coll. area 58 Port Phillip Heads.

'This little creeping species is practically cosmopolitan and has been listed in nearly every paper dealing with shorewise Bryozoa in the temperate and tropical regions' (Osburn 1953: 11).

Aetea sica (Couch, 1844)

Aetea sica Couch, 1844: 102.
Aetea recta Hincks, 1880: 6, Pl. 1, figs. 6-7; MacGillivray 1889: 287, Pl. 178, fig. 1.

Survey area 58 (150-4), MacGill. Coll. area 58 Port Phillip Heads.

A widely distributed species, recorded from Europe and America.

Aetea sp.

Survey area 59 (36).

Division MALACOSTEGA Levinsen, 1909

Family SCRUPARIIDAE (Busk, 1852), Harmer, 1926

Scruparia Oken, 1815

Scruparia ambigua (d'Orbigny, 1841)

Eucrates ambigua d'Orbigny, 1841, Pl. 3, figs. 13-17; 1847: 11.
? *Scruparia chelata* McGill., 1889 (non Linnaeus 1758): 287-288, Pl. 178, figs. 2-2a, 3.

Survey area 53 (253), 58 (150-4) (290), 59 (36), MacGill. Coll. area 58 Port Phillip Heads on algae and zoophytes. This species has been much confused with *S. chelata* (Linnaeus) and Dr Anna B. Hastings has pointed out the differences (1941), she shows that it has a very wide distribution around the world (Osburn 1953: 16).

Family MEMBRANIPORIDAE Busk, 1854

Membranipora de Blainville, 1830

Membranipora membranacea (Linnaeus, 1767)

Flustra membranacea Linnaeus, 1767: 1301.
Membranipora membranacea, MacGill., 1879: 29, Pl. 25, figs. 1-1b.

Survey areas 6 (137), 58 (80), 59 (36).

On *Macrocystis* at station 36. 'Of frequent occurrence everywhere on our shores, creeping over broad seaweeds' (MacGillivray 1879, Pl. 29). It has been reported from various regions around the world.

Membranipora perfragilis (MacGill., 1881)

Biflustra fragilis MacGill., 1869: 138.
Biflustra perfragilis MacGill., 1881A: 27, Pl. 57, figs. 1-1e.
Membranipora crassimarginata var. *erecta* Busk, 1884: 63, Pl. 14, figs. 3-3a.
Acanthodesia perfragilis, Hastings, 1945: 98.

Survey 59 (Portsea Pier intertidal coll. 27 Mar. 1960), MacGill. Coll. area 58 Port Phillip Heads.

The figured specimen of *Membranipora crassimarginata* var. *erecta* of the Challenger Report is from Bass Strait, and Waters (1898: 658) indentifies it with *Biflustra perfragilis* MacGillivray, which was described from the same locality.

(?) **Membranipora papulifera** (MacGill., 1882)

Membranipora papulifera MacGill., 1882: 116, fig. 9.

Survey area 10 (103-5), McGill. Coll. area 58 Port Phillip Heads.

Growing on *Mytilus planulatus* in association with *Bugula neritina, Celleporella hyalina* and *Bowerbankia* sp.

Conopeum Gray, 1848

Conopeum reticulum (Linnaeus, 1767)

Millepora reticulum Linnaeus, 1767: 1284.
Membranipora lacroixii MacGillivray (non Savigny), 1879: 35, Pl. 26, figs. 5-5a, 6-6a.

Survey area 17 (172), 29 (174), 30 (130), 59 (24) (36), MacGill. Coll. area 10 Point Cook, area 7 Brighton, area 58 Queenscliff.

At (24) growing on *Celleporaria prolifera* in association with *Crisia tenuis, Bugula dentata*

and *Scrupocellaria diadema* and at (130) growing on *Mytilus planulatus* in association with *Rhynchozoon tubulosum* and at (174) again on *Mytilus* in association with *Celleporaria verrucosa*.

A cosmopolitan species generally confused with *lacroixii* Audouin.

Family FLUSTRIDAE Smitt, 1867
Spiralaria Busk, 1861
Spiralaria denticulata (Busk, 1852)

Flustra denticulata Busk, 1852: 380; MacGillivray, 1880: 27, Pl. 45, figs. 1-1g.
Flustra denticulata var. *inermis*, Busk, 1852A, Pl. 49, figs. 3-4.

Survey area 57 (294), 58 (88), (291-2, 59 (36), 66 (291-2), MacGill. Coll. area 58 Queenscliff.

'A very variable species, the only constant character being the minute denticles within the inner edge of the margin of the cells' (MacGillivray 1880: 27).

Bugularia Levinsen, 1909
Bugularia dissimilis (Busk, 1852)

Carbasea dissimilis, Busk, 1852A: 51, Pl. 50, figs. 4-7; MacGillivray, 1880: 28-29, Pl. 45, figs. 3-3d.
Bugularia dissimilis, Levinsen, 1909: 109, Pl. 5, figs. 2a-2d.

Survey area 59 (36), MacGill. Coll. area 58 Queenscliff.

Family ALDERINIDAE Canu and Bassler, 1927
Amphiblestrum Gray, 1848
Amphiblestrum sp.
Pyrulella Harmer, 1926
Pyrulella pyrula (Hincks, 1881)

Membranipora lineata (MacGill., 1879 (non Linnaeus): 34, Pl. 26, figs. 3-3a.
Membranipora pyrula Hincks, 1881: 3; MacGillivray, 1886A, Pl. 126, figs. 1-1b, 2.

Survey area 59 (36), MacGill. Coll. area 58 Port Phillip Heads.

Family HIANTOPORIDAE MacGill., 1895
Hiantopora McGill., 1887
Hiantopora ferox (MacGill., 1869)

Lepralia ferox MacGill., 1869: 132; 1879: 34, Pl. 38, figs. 8-8c.

Survey areas 59 (36), MacGill. Coll. areas 6 Williamstown, 59 Queenscliff.

On algae.

Family ARACHNOPODIIDAE Harmer, 1957
Arachnopusia Jullien, 1888
Arachnopusia monoceros (Busk, 1854)

Lepralia monoceros Busk, 1854: 72, Pl. 93, figs. 5-6.
Cribrilina monoceros Busk, 1884: 133-134, Pl. 19, figs. 8-8c.
Lepralia monoceros MacGill., 1879: 32, Pl. 38, figs. 1-2.

Survey areas 66 (291-2), MacGill. Coll. area 58 Port Phillip Heads.

Division COELOSTEGA Levinsen, 1909
Family MICROPORIDAE Hincks, 1880
Caleschara MacGill., 1880
Caleschara denticulata (MacGill., 1869)

Eschara denticulata MacGill., 1869: 138.

Survey area 58 (88), MacGill. Coll. area 55 Schnapper Point.

Family STEGANOPORELLIDAE Hincks, 1884
Steganoporella Smitt, 1873
Steganoporella magnilabris Busk, 1854

Membranipora magnilabris Busk, 1854: 62, Pl. 65, fig. 4.
Steganoporella magnilabris, MacGill., 1885: 43-44, Pl. 60, fig. 1-1c.

Survey areas 55 (149), 59 (23) (36).

Type species, *Steganoporella (Steginoporella) elegans* Smitt (= *Mebranipora magnilabris* Busk) according to Osburn 1950: 107.

Family THALAMOPORELLIDAE Levinsen, 1902
Thairopora MacGill., 1882
Thairopora cincta (Hutton, 1878)

Membranipora cincta Hutton, 1878: 23.
Diplopora cincta, MacGill., 1881: 15, figs. 1-1c.
Diploporella cincta, MacGill., 1885: 98.
Thalamporella cincta, Levinsen, 1909: 179, 192-193, Pl. 22, figs. 7a-7d.

Survey areas 50 (229), 58 (150-4).

'Of this species I have examined two dry colonies from Port Phillip found in the collections of Algae at the Botanical Museum' (Levinsen 1909: 193).

Thairopora mamillaris (MacGill., 1860)
(?Lamouroux, 1816)

(?) *Flustra mamillaris* Lamouroux 1816: 110, Pl. 1, figs. 6a-b.
Membranipora mamillaris MacGill., 1860A: 165, Pl. 2, fig. 3, Queenscliff (Vict.); 1879: 30, Pl. 25, figs. 4-4a.
Thairopora mamillaris McGill., 1882A: 118, figs. 7-7a; 1890A: 351, Pl. 196, fig. 2.
Thalamoporella mamillaris Levinsen, 1909: 178-179, 194-195, Pl. 6a, figs. 5-5e.

Survey area 58 (293), MacGill. Coll. area 58 Queenscliff, on seaweed.

An Australian species.

Thairopora sp.

Survey area 59 (36).

Division PSEUDOSTEGA Levinsen, 1909
Family CELLARIIDAE Hincks, 1880
Cellaria Ellis and Solander, 1786
Cellaria punctata (Busk, 1852)

Salicornaria punctata Busk, 1852: 366.
Salicornaria gracilis Busk, 1852A: 17, Pl. 63, fig. 3; Pl. 65 (bis), fig. 2.
Cellaria gracilis, MacGill., 1880: 50, Pl. 49, fig. 4-4c; 1885: 94, Pl. 1, fig. 8.

Survey area 59 (36), MacGill. Coll. area 58 Queenscliff.

Harmer (1926: 338) states that 'In his British Museum Catalogue Busk (1852A: 17) substituted *Salicornaria gracilis* for *S. punctata* of his earlier work (1852: 366) of the same year.'

Cellaria hirsuta (MacGill., 1869)

Salicornaria hirsuta MacGill., 1869: 129.
Cellaria hirsuta MacGill., 1880: 48-49, Pl. 49, figs. 2-2b.

Survey areas 58 (3) (290), 59 (36), MacGill. Coll. area 58 Queenscliff.

MacGillivray (1880: 49) simply states it is frequent.

Cellaria tenuirostris (Busk, 1852)

Salicornaria tenuirostris Busk, 1852A: 17-18, Pl. 63, fig. 4.
Cellaria tenuirostris, MacGill., 1880: 49-50, Pl. 49, figs. 3-3c.

Survey area 59 (36), MacGill. Coll. area 58 Queenscliff.

Division CELLULARINA Smitt, 1867
Family FARCIMINARIIDAE Busk, 1852
Didymozoum Harmer, 1923
Didymozoum simplex (Busk, 1852)

Didymia simplex Busk, 1852: 35, Pl. 39.
Didymia simplex MacGill., 1880: 34-35, Pl. 46, fig. 6.

Survey area 59 (36), MacGill. Coll. area 58 Port Phillip Heads.

Didymozoum was proposed by Harmer (1923: 306-307) to replace *Didymia* Busk (pre-occupied by *Didymia* Le Peletier and Serville, 1828), and with the same type species *Didymia simplex* Busk, 1852 (p. 384).

Family BICELLARIELLIDAE Levinsen, 1909

Various authors have separated this family into three, viz. Bicellariellidae, Bugulidae and Beaniidae. Harmer (1926: 409-410) only accepts Bicellariellidae.

Beania Johnston, 1840
Beania crotali (Busk, 1852)

Diachoris crotali Busk, 1852: 54, Pl. 66, figs. 1-2.
Beania crotali, MacGill., 1886: 68-69, Pl. 117, figs. 4-5.

Survey area 55 (149), MacGill. Coll. area 58 Port Phillip Heads.

Beania magellanica (Busk, 1852)

Diachoris magellanica Busk, 1852: 382; 1852A: 54, Pl. 67, figs. 1-3; MacGillivray, 1880: 32, Pl. 46, fig. 2.

Survey area 59 (23), MacGill. Coll. Portland.

'This species is distributed around the world in the southern hemisphere and as far north as the Mediterranean Sea and Japan. In American waters it has hitherto been noted only at the Straits of Magellan (Busk), and Terra del Fuego and the Falkland Islands (Calvet).' Osburn 1953: 172.

Beania spinigera (MacGill., 1860)

Diachoris spinigera MacGill., 1860A: 9, Pl. 2, figs. 1-2; MacGill., 1880: 32-33, Pl. 46, fig. 3.

Survey area 59 (23), MacGill. Coll. area 58 Queenscliff.

Dimetopia Busk, 1852
Dimetopia cornuta Busk, 1852

Dimetopia cornuta Busk, 1852: 384; 1852A: 35-36, Pl. 29, figs. 2-3.
Dimetopia cornuta MacGill., 1880: 34, Pl. 46, fig. 5. Survey area 59 (36), MacGill. Coll. area 58 Queenscliff.

Dimetopia spicata Busk, 1852

Dimetopia spicata Busk, 1852: 384; 1852A: 35, Pl. 29, fig. 1.
Dimetopia spicata, MacGill., 1880: 33, Pl. 46, fig. 4.

Survey area 59 (36), MacGill. Coll. area 58 Port Phillip Heads.

Cornucopina Levinsen, 1909
Cornucopina grandis (Busk, 1852)

Bicellaria grandis Busk, 1852: 374; 1852A: 42, Pl. 44, figs. 1-3.
Bicellaria grandis MacGill., 1881A: 38, Pl. 59, figs. 2-3.

Survey areas 57 (294), 58 (150-4) (290),

59 (36), 66 (291-2), MacGill. Coll. area 58 Queenscliff.

Cornucopina tuba (Busk, 1852)

Bicellaria tuba Busk, 1852: 373; 1852A: 42, Pl. 31, figs. 1-4.
Bicellaria tuba MacGillivray, 1880: 37, Pl. 59, fig. 1a-d.

Survey area 58 (290), MacGill. Coll. area 58 Queenscliff.

Harmer (1926: 422) stated that in addition to *Bicellaria grandis*, inter alia *Bicellaria tuba* may be referred to *Cornucopina*.

Bugula Oken, 1815

Bugula dentata (Lamouroux, 1816)

Acamarchis dentata Lamouroux, 1816: 135, Pl. 3, fig. 3.
Bugula dentata, Busk, 1852: 46, Pl. 35, figs. 1-5.
Bugula dentata, MacGill., 1885A: 31, fig. 3.

Survey areas 58 (89), 59 (24), 61 (239), MacGill. Coll. area 6 Hobson Bay, area 58 Queenscliff.

At Station 24 growing on *Cellepora prolifera* in association with *Crisia tenuis, Conopeum reticulum* and *Scrupocellaria diadema. Bugula dentata* appears to have a wide distribution, from S. Africa up the W. coast to the Cape Verde Is. and Madeira, as well as on the Australian and Japanese coasts (Harmer 1926: 441).

Bugula neritina (Linnaeus, 1758)

Sertularia neritina Linneaus, 1758: 815.
Bugula neritina, MacGill., 1881A: 41, Pl. 59, fig. 7.

Survey areas 10 (103-5), 12 (196), MacGill. Coll. area 6 Hobson Bay, area 58 Queenscliff, Warrnambool.

At Station 103-5 growing on *Mytilus planulatus* in association with *Biflustra papillifera, Celleporella bougainvillei* and *Bowerbankia* sp. This, the type species of the genus, is also the best known. It appears to be distributed everywhere in warmer waters along the shores (Harmer 1953: 154). It might be introduced by ships.

Bugula sp.

Survey area 12 (196).

Family SCRUPOCELLARIIDAE Levinsen, 1909

Scrupocellaria van Beneden, 1845

Scrupocellaria cyclostoma Busk, 1852

Scrupocellaria cyclostoma Busk, 1852A: 24-25, Pl. 28, figs. 4-5.
Scrupocellaria cyclostoma MacGill., 1886: 99-100, Pl. 126, fig. 3-3b.

Survey area 58 (88), MacGill. Coll. area 58. Port Phillip Heads.

Harmer (1926: 369) indicated that he had no satisfactory evidence that an allied species, *Scrupocellaria ferox* Busk, 1825 (Busk 1852A: 25, Pl. 22, figs. 1-2, 5) occurred in S. Australia where it seemed to be replaced by *Scrupocellaria cyclostoma* Busk, 1852.

Scrupocellaria diadema Busk, 1852

Scrupocellaria diadema Busk, 1852: 370; 1852A: 24, Pl. 28, figs. 1-3.
Scrupocellaria cervicornis Busk, 1852: 370; 1852: 24, Pl. 62, figs. 1-4; MacGill., 1886: 101, Pl. 126, figs. 6-7.
Scrupocellaria diadema, Harmer, 1926: 375-378, Pl. 25, figs. 20-25.

Survey area 59 (24), MacGill. Coll. area 58 Port Phillip Heads.

On *Cellepora prolifera* in association with *Crisia tenuis, Conopeum reticulum* and *Bugula dentata.*

Scrupocellaria ornithorhyncus Wyville Thomson, 1858

Scrupocellaria ornithorhynchus Wyville Thomson, 1858: 144, Pl. 12, fig. 2.

Survey area 59 (36), MacGill. Coll. area 58 Port Phillip Heads.

Scrupocellaria ornithorhynchus was described from Bass Strait by Wyville Thomson as having 4-5 long spines, a well-developed proximal cryptocyst, and a narrow, curved distal lobe in its scutum. The lobe appears to be variable in Victorian specimens (Harmer 1926: 373).

Scrupocellaria scrupea Busk, 1852

Scrupocellaria scrupea Busk, 1852A: 24, Pl. 21, figs. 1-2.
Scrupocellaria scrupea MacGill., 1886A: 101, Pl. 126, fig. 8.

Survey areas 11 (212), 12 (196), 35 (71), 53 (253), 55 (149), 58 (290), 59 (36), 66 (291-2), MacGill. Coll. areas 58 Port Phillip Heads.

Scrupocellaria scruposa (Linnaeus, 1758)

Sertularia scruposa Linnaeus, 1758: 815.
Scrupocellaria scruposa Busk, 1852, Pl. 22, figs. 3-4.

Survey areas 7 (123), 11 (212), 12 (196), 21 (115), 35 (71), 55 (39), 57 (294), 58 (Ocean Beach, Point Nepean intertidal coll. 29 June 1963) 59.

A very widely distributed species.

Amastigia Busk, 1852

Amastigia rudis (Busk, 1852)

Cabera rudis Busk, 1852: 377; 1852A: 38, Pl. 46, figs. 1-3; MacGill., 1887B: 137, Pl. 136, fig. 1.
Amastigia rudis, Harmer, 1923: 332, Pl. 17, figs. 26-27; Pl. 19, figs. 49, 52; 1926: 349-351, Pl. 23, figs. 9-13.

Survey area 58 (150-4), MacGill. Coll. area 58 Port Phillip Heads.

This species is common and widely distributed in the W. Pacific from Japan to Australia, where it is known to extend from Victoria, through to Queensland. It has not been reported from the E. Pacific region (Harmer 1926: 350; Osburn 1953: 127).

Bugulopsis cuspidata (Busk, 1852)

Cellularia cuspidata Busk, 1852: 19.

Survey areas 58 (88) (290), 59 (36) (87), 66 (291-2).

Caberea Lamouroux 1816

Caberea darwinii Busk, 1852

Caberea darwinii, Busk 1884: 29, Pl. 32, fig. 6.

Survey area 59 (36), MacGill. Coll. area 58 Port Phillip Heads.

Caberea glabra MacGillivray, 1886

Caberea glabra McGill., 1887: 142, Pl. 137, figs. 2-4.

Survey area 59 (36), MacGill. Coll. area 58 Port Phillip Heads.

Caberea transversa Harmer, 1926 resembles *Caberea grandis* Hincks, 1881 (see next species), which differs from it in being pluriserial and in having occasional gigantic frontal avicularia. It appears to be also related to *Caberea glabra* MacGillivray, 1886, which differs from it in its larger spines and in the larger size of the frontal avicularia.

Caberea grandis Hincks, 1881

Caberea grandis Hincks, 1881: 2.

Survey area 59 (36), MacGill. Coll. area 58 Port Phillip Heads.

There is only a slight serration in Victorian specimens.

Caberea sp.

Survey areas 56 (295), 59 (24).

Canda Lamouroux, 1816

Canda arachnoides, Lamouroux, 1816

Canda arachnoides, Lamouroux, 1816: 131.

Survey area 58 (88), MacGill. Coll. area 58 Port Phillip Heads.

Canda tenuis MacGillivray, 1885

Canda tenuis MacGill., 1885: 108, Pl. 4, fig. 1; MacGill., 1887: 139-140, Pl. 136, figs. 4-4b.

Survey area 58 (88), MacGill. Coll. area 58 Port Phillip Heads.

Readily distinguished from *C. arachnoides* by its much smaller size, more slender and straggling branches, which do not grow so much in one plane, narrower and more pointed avicularian mandible, and especially by the vibracular grooves for the lodgment of the setae extending across the median line on the surface of a cell of the other series (MacGillivray: 139-140).

Menipea Lamouroux, 1812

Menipea crystallina Gray, 1843

Menipea crystallina Gray, 1843, Dieffenbach, New Zealand, 2, p. 293; MacGillivray, 1881A: 31-32, Pl. 58, figs. 2-2b.

Survey areas 57 (295), 58 (88), 59 (36), MacGill. Coll. area 58 Queenscliff.

Menipea sp.

Survey area 59 (225).

Suborder Ascophora Levinsen, 1909

Family Hippothoidae Levinsen, 1909

Celleporella Gray, 1848

Celleporella hyalina (Linneaus, 1767)

Cellepora hyalina, Linnaeus, 1767: 1286.
Schizoporella hyalina MacGill., 1889A: 314-315, Pl. 186, figs. 7-9.

Survey areas 10 (103-5), 58 (88), 61 (239), 69 (221), MacGill. Coll. area 6 Williamstown, area 58 Queenscliff.

At (103-5) growing on *Mytilus planulatus* in association with *Biflustra papillifera, Bugula neritina* and *Bowerbankia* sp. It is a truly cosmopolitan species, occurring around the world and from the Arctic, where it is often excessively abundant, to the tropics (Osburn 1952: 277).

Family Euthyroididae Levinsen, 1909

Euthyroides Harmer, 1903

Euthyroides episcopalis (Busk, 1852)

Carbasea episcopalis Busk, 1852: 379; 1852A: 52, Pl. 48, figs. 1-2; Pl. 55, fig. 3.
Carbasea episcopalis MacGill., 1880: 28, figs. 2-2c.

Survey area 58 (150-4), MacGill. Coll. area 58 Queenscliff.

The ovicells are very peculiar, presenting a

curious resemblance to a bishop's mitre (MacGillivray 1880:28).

Family SCHIZOPORELLIDAE Jullien, 1883

Schizoporella Hincks, 1877

Schizoporella biturrita Hincks, 1884

Schizoporella biturrita Hincks, 1884: 280; MacGill., 1889A: 313, Pl. 186, figs. 5-5b.

Survey areas 58 (88), 59 (36), MacGill. Coll. area 58 Port Phillip Heads.

MacGillivray (1889: 313) was prompted to state, 'This very peculiar and striking species is readily distinguished. It forms thick, calcareous layers, usually surrounding the stems of small dark algae'.

Schizoporella sp.

Survey areas 57 (294), 58 (150-4).

Family MICROPORELLIDAE Hincks, 1879

Microporella Hincks, 1877

Microporella ciliata (Pallas, 1766)

Eschara ciliata Pallas, 1766: 38.
Lepralia ciliata, Busk, 1854: 73, Pl. 74, figs. 1-2, Pl. 77, figs. 3-5.
Lepralia ciliata MacGill., 1879A: 28, Pl. 37, figs. 1-1b.

Survey areas 5 (57), 11 (190), 35 (71), MacGill. Coll. area 58 Queenscliff; Port Fairy, Warrnambool.

At station 57 growing on *Mytilus planulatus* in association with *Mucropetraliela watersi* and *Celleporaria foliata*. A cosmopolitan species in which Osburn (1952: 375) encountered such a remarkable degree of variation from the Pacific Coast of America that he was prompted to state, 'The question of what is a "good species" rises again and again in this genus, as most of the differential characters are subject to variation' (Powell 1967: 289 also has quoted this last sentence).

Fenestrulina Jullien, 1888

Fenestrulina malusii (Audouin, 1826)

Cellepora malusii Audouin, 1826: 239; 1828: 66; Savigny, De, Pl. 8, fig. 8.
Lepralia malusii, Busk, 1854: 83, Pl. 103, figs. 1-4; MacGillivray, 1879A: 27, figs. 8-8b.

Survey areas 6 (137), 58 (88), 66 (291-2), MacGill. Coll. area 58 Queenscliff on shell and algae. It apparently occurs around the world in tropical and temperate waters (Osburn 1952: 388).

Fenestrulina sp.

Survey area 66.

Family PETRALIELLIDAE Harmer, 1957

Mucropetraliella Stach, 1936

Mucropetraliella ellerii (MacGill., 1869)

Lepralia ellerii MacGillivray, 1869: 135; 1879A: 31, Pl. 37, figs. 8-8b.

Survey areas 5 (51-58), 42 (38), MacGill. Coll. area 6 Williamstown on algae and shells.

Stach (1936) has chosen *Mucropetraliella ellerii* as type species, and Harmer (1957) has described the species under two Sections (A, B) characterized respectively by the absence or presence of oral spines. Oral spines are wanting in *Mucropetraliella ellerii* (Section A).

Mucropetraliella serrata (Livingstone, 1926)

Petralia vultur var. *serrata* Livingstone, 1926: 95, Pl. 6, figs. 7-10.

Survey area 58 (293), MacGill. Coll. area 58 Port Phillip Heads.

Oral spines present (Section B).

Mucropetraliella watersi Harmer, 1957

Petralia vultur var. *armata* Waters, 1913: 518, Pl. 70, figs. 15-20.
Mucropetraliella watersi Harmer 1957: 721, Pl. 46, fig. 9, Fig. 67.

Survey area 5 (57).

Growing on *Mytilus planulatus* in association with *Microporella ciliata* and *Celleporaria foliata*.

Mucropetraliella sp.

Survey area 66 (294).

Family SMITTINIDAE Levinsen, 1909

Parasmittina Osburn, 1952

Parasmittina trispinosa (Johnston, 1838)

Discopora trispinosa Johnston, 1838: 222.

Survey area 59 (36).

Osburn (1952: 412) comments, 'If all the varieties which have been described under this species really belong here, it is probably the most variable species known. It has been given cosmopolitan distribution'.

Parasmittina macphersonae Powell, 1957

Smittia reticulata MacGillivray, var. *spathulata* MacGillivray, 1883: 135, Pl. 3, figs. 14-14a.

Survey area 11 (212).

From the description by Powell (1957: 381, Pl. 17, fig. c), it is quite clear that the species intended by him is identical with *Smittia reticulata spathulata*.

Smittina Norman, 1903
Smittina sp.

Survey area 10.

Family MARGARETTIDAE Harmer, 1957
Margaretta Gray, 1843
Margaretta hirsuta (Lamouroux, 1816)

Cellaria hirsuta Lamouroux, 1816: 126, Pl. 2, figs. 4a, B "Amérique".
Tubucellaria hirsuta MacGill., 1880: 52, Pl. 49, figs. 6-6a, Vict.

Survey area 58 (150-4), MacGill. Coll. area 58 Queenscliff.

Margaretta has been recognized as a valid generic name. 'On the assumption that *Tubucellaria* is a synonym of *Margaretta*, Tubucellariidae should be replaced by Margarettidae' (Harmer 1957: 824).

Family RETEPORIDAE Smitt, 1867
Retepora Lamarck, 1801
Retepora avicularis MacGill., 1884

Retepora avicularis, MacGill., 1884: 288, Pl. 2, fig. 6; 1885C: 16, Pl. 94, fig. 16; Pl. 95, figs. 7-11.
Retepora jacksoniensis, Busk, 1884: 125, Pl. 27, fig. 4.

Survey areas 58 (89) (150-4) (290), 59 (36), MacGill. Coll. area 58 off Port Phillip Heads.

At (89) on sponge.

Retepora sp.

Survey areas 57 (294), 59 (87).

Rhynchozoon Hincks, 1895
Rhynchozoon tubulosum (Hincks, 1880)

Mucronella (?) *tubulosa* Hincks, 1880: 383, Pl. 17, fig. 7.
Rhynchopora profunda, MacGill, 1883: 193, Pl. 2, figs. 8-8b.
Rhynchopora longirostris MacGill., 1890: 356, Pl. 196, figs. 13-13b.

Survey area 30 (13), MacGill. Coll. area 58 Port Phillip Heads.

Growing on *Mytilus planulatus* in association with *Conopeum reticulum* and *Celleporaria foliata*. Osburn (1952: 454) remarks that the species of the genus *Rhychozoon* often are difficult to determine, as secondary calcification, which is very heavy, obscures the primary characters and these can be found only on the young zooecia at the edge of the colony. It is one of the genera that 'try men's souls'.

Schizoretepora Gregory, 1893
Schizoretepora tessellata (Hincks, 1878)

Retepora tessellata Hincks, 1878: 358, Pl. 19, figs. 9-12; MacGillivray, 1885C: 29-30, Pl. 99, figs. 4-8.

Survey area 57 (294), 58 Point Nepean intertidal coll. (ocean beach) 29 June 1963, 59 (36), MacGill. Coll. area 58 Port Phillip Heads.

Triphyllozoon Canu and Bassler, 1917
Triphyllozoon monilifera (MacGillivray, 1860)

Retepora monilifera MacGillivray, 1860A: 168, Pl. 3, figs. 6-9.
Retepora monilifera form. monilifera MacGill., 1885, pp. 20-21; Pl. 96, figs. 1-3, Pl. 94, fig. 1

Survey areas 57 (294), 58 (80) (290) (intertidal collecting ocean beach Point Nepean, 29 June 1963), 59 (23) (24) (36), MacGill. Coll. area 59 Queenscliff.

Type species selected by Canu and Bassler (1917) *Retepora monilifera* MacGill., 1860: 168 = *Retepora monilifera* forma *moniliferae* MacGill., 1885: 20-21 (Harmer 1934: 590). 'This common form is confined to shallow water. On the framework of the wooden pier at Queenscliff it forms large masses, almost dry at low tide' (MacGillivray 1885: 20).

Family ADEONIDAE Jullien, 1903
Adeona Lamouroux, 1812
Adeona grisea Lamouroux, 1816

Adeona grisea, Lamouroux, 1816. Exposition Méthodique, p. 40, t.70, fig. 5.
Dictyopora grisea MacGill., 1882: 23-24, figs. 1-1e.

Survey areas 56 (295), 58 (290), 59 (36), MacGill. Coll. area 58 Port Phillip Heads.

Adeona sp.

Survey area 69 (24).

Adeonella Busk, 1884
Adeonella cellulosa (MacGill., 1869)

Dictyopora cellulosa, MacGill., 1869: 140; 1880: 37-38, Pl. 47, figs. 1-1d.

Survey areas 56 (295), 69 (221), MacGill. Coll. area 58 Queenscliff.

Adeonella gracilis (Lamouroux, 1824)

Eschara gracilis Lamouroux, 1824: 375; Busk, 1854: 91, Pl. 108, figs. 5-7; MacGill., 1880: 40-41, Pl. 48, figs. 3-3c.

Survey area 58 (290), MacGill. Coll. area 58 Queenscliff.

MacGillivray (1887: 190) may be considered to have accepted *Eschara gracilis* as the type species of *Porina* (Harmer 1957: 843).

Adeonellopsis MacGillivray, 1886

Adeonellopsis mucronata (MacGill., 1869)

Lepralia mucronata MacGill., 1869: 134.
Eschara mucronata, 1880: 43-44, Pl. 48, figs. 6-6c, 7 7d.

Survey area 58 (88), MacGill. Coll. area 58 Queenscliff on shell, area 55 Schnapper Point.

Adeonellopsis sp.

Survey area 56 (295), 58 (150-4).

Family CELLEPORARIIDAE Harmer, 1957

Celleporaria Lamouroux, 1821

'The species of *Celleporaria* are so difficult to distinguish that I think it necessary to subjoin notes on certain other species which appear to be allied to *C. fusca*' (Harmer 1957: 683).

Celleporaria foliata (MacGill., 1888)

Cellepora foliata (MacGill.), 1888A: 246, Pl. 166, figs. 2-2a; Pl. 168, fig. 10.

Survey areas 5 (57), 10 (103), 30 (130), 43 (303), 59 (24, 36).

At station 57 growing on *Mytilus planulatus* in association with *Microporella ciliata* and *Mucropetraliella watersi* and also at (130) in association with *Conopeum reticulum* and *Rhynchozoon tubulosum*. '*C. foliata* MacGill. seems to be a distinct species' (Harmer 1957: 684).

Celleporaria verrucosa MacGillivray, 1880

Cellepora verrucosa (MacGill.) 1882; 245-246, Pl. 166, 1-1f; P. 168, fig. 15.

Survey areas 6 (65), 29 (174), 57 (294), 59 (24).

At station 174 growing on *Mytilus planulatus* in association with *Canopeum reticulum*.

Celleporaria albirostris (Smitt, 1873)

Discopora albirostris Smitt, 1873; 70, Pl. 12, figs. 234-239.
Holoporella albirostris, Osburn, 1952: 497, Pl. 61, figs. 3-6 = *Celeporaria tridenticulata* (Powell 1967: 374).

Survey area 62 (96), MacGill. Coll. area 58 Port Phillip Heads.

'*C. albirostris* Smitt as *Discopora albirostris* forma *typica* should be placed in *Celleporaria*' (Harmer 1957: 684). Smitt described the species from Florida, and it is a common species in the Gulf of Mexico and the Caribbean Sea. It has been recorded from the Indian Ocean and from Australia (Osburn 1952: 498).

Celleporaria mamillata (Busk, 1854)

Cellepora mamillata Busk, 1854: 87, Pl. 120, figs. 3-5.

Survey area 61 (239).

'The operculum differs so much from those of *C. fusca* that the two species may confidently be regarded as distinct' (Harmer 1957: 683).

Celleporaria prolifera (MacGill., 1888)

Cellepora prolifera (MacGill., 1888A: 247, Pl. 166, figs. 4-4b.

Survey areas 6 (65), 55 (39), 58 (290), 59 (24) (36), Maple. Coll. Portland.

At station 24 it has *Crisia tenuis, Conopeum reticulum, Bugula dentata* and *Scrupocellaria diadema* growing on it.

Celleporaria sp.

Survey areas 6 (137), 35 (71), 55 (39), 56 (295), 57 (294), 58 (88) (290), 59 (36), 61 (242), 66 (291-2).

At (39) growing on *Mytilus planulatus*.

Family CELLEPORIDINAE Harmer, 1957

Celleporina Gray, 1848

Celleporina costazii (Audouin, 1826)

Cellepora costazii Audouin, 1826: 237; 1828: 64; Savigny, Pl. 7, figs. 4^1-4^6.
? *Cellepora costazii* MacGillivray, 1885: 116, figs. 3a-b.

Survey area 58 (290), MacGill. Coll. area 58 Port Phillip Heads.

Specimens determined as *Cellepora costazii* have been recorded from the tropical and temperate parts of all the oceans (Harmer 1957: 903).

Family VITTATICELLIDAE Harmer, 1957

'Since *Catenicella* cannot be accepted in the generally adopted sense, the Family name Catenicellidae is also invalid; and I accordingly suggest in its place the new name Vittaticellidae, *Vittaticella* being the genus which includes the largest number of species' (Harmer 1957: 765). 'The family, which is abundant in the Australian seas, is scarcely represented N. of the equator and hitherto no species has been

recorded from the W. coasts of the Americas' (Osburn 1952: 286).

Vittaticella Maplestone, 1901
Vittaticella elegans (Busk, 1852)

Catenicella elegans Busk, 1852: 361, Pl. 1, fig. 2; 1852A: 10, Pl. 9, figs. 3-4; MacGill., 1879: 23, Pl. 24, figs. 10-10b.

Survey areas 58 (150-4), 59 (36) (79).

MacGillivray (1879: 23) states, 'frequent', 'Occurs commonly on the S. coast of Australia and off New Zealand' (Harmer 1957: 770). 'Distributed around the world in warmer waters' (Osburn 1952: 287).

Vittaticella buskii (Wyville Thomson, 1858)

Catenicella buskii Wyville Thomson, 1859: 139, Pl. 11, fig. 2; MacGillivray, 1879: 24, figs. 13-13b.

Survey areas 58 (150-4), 59 (36) (225), MacGill. Coll.

Vittaticella perforata (Busk, 1852)

Catenicella perforata, Busk, 1852A: 10, Pl. 8, figs. 1-2; MacGillivray, 1879: 24, figs. 11-11e.

Survey area 59 (36).

Vittaticella sp.

Survey areas 58 ( ), 59 (87).

Costaticella Maplestone, 1899
Costaticella hastata (Busk, 1852)

Catenicella hastata Busk, 1852: 355; 1852A: 7, Pl. 2, figs. 3-4; MacGillivray, 1879: 19, figs. 4-4c.

Survey areas 58 (88) (290), 59 (36), MacGill. Coll. area 58 Queenscliff.

Distribution in Australia: Vict. N.S.W., Bass Strait, Tas. (Powell 1967: 243).

Scuticella Levinsen, 1909
Scuticella lorica Busk, 1852

Catenicella lorica Busk, 1852: 358; Busk, 1852A: 6, Pl. 1, figs. 1-3; MacGill., 1879: 24, figs. 8-8b.

Survey area 58 (150-4), MacGill. Coll. area 58 Queenscliff.

Scuticella margaritacea (Busk, 1852)

Catenicella margaritacea Busk, 1852: 356; 1852A: 9, Pl. 6, figs. 1-3; MacGill., 1879: 15-16, Pl. 24, figs. 1-1d.
Scuticella margaritacea Levinsen, 1909: 229-230, Pl. 20, fig. 3a, Pl. 11, figs. 5a-c.

Survey areas 58 (150-4), 59 (36).

MacGillivray (1879: 16) simply states, 'common on the Victorian coasts'.

Scuticella plagiostoma (Busk, 1852)

Catenicella plagiostoma Busk, 1852: 358; 1852A: 8-9, Pl. 5, figs. 1-2; MacGill., 1879: 17-18, Pl. 24, figs. 2-2c.

Survey area 59 (36).

'Very common' in Vict. (MacGillivray 1879: 17).

Scuticella ventricosa (Busk, 1852)

Catenicella ventricosa Busk, 1852: 357; 1852A: 7, Pl. 2, figs. 1-2; Pl. 3, figs. 1-5; MacGill., 1879: 18, Pl. 24, figs. 3-3b.

Survey area 59 (36).

S. Aust., Vict., N.S.W., Tasm. (Powell 1967: 240).

Cornuticella Canu and Bassler, 1927
Cornuticella cornuta (Busk, 1852)

Cornuticella cornuta Busk, 1852: 361; Busk, 1852A: 11, Pl. 10, figs. 1-3.
Cornuticella comuta MacGill., 1879: 27; 1885B: 34, Pl. 90, figs. 3-3c.
Catenaria cornuta Levinsen, 1909: 256-7, Pl. 13, figs. 5a-c; Pl. 21, fig. 1a.

Survey area 57 (294), MacGill. Coll. area 58 Queenscliff.

Victoria, Bass Strait (Powell 1967: 241).

Pterocella Levinsen, 1909
Pterocella alata (Wyville Thomson, 1858)

Catenicella alata Wyville Thomson, 1858: 137; Levinsen, 1909: 246-247; MacGill., 1879, Pl. 24, figs. 7-7b.

Survey areas 58 (293), 59 (87), MacGill. Coll. area 58 Queenscliff.

Australia: N.S.W., Vict., Tasm. (Powell 1967: 244).

Claviporella MacGill., 1895
Claviporella aurita (Busk, 1852)

Catenicella aurita Busk, 1852A: 8, Pl. 4, figs. 1-3; MacGill., 1879: 26, Pl. 24, figs. 16-16c.

Survey area 58 (150-4).

Claviporella pulchra (McGill.) and *Claviporella imperforata* (McGill.)—the last mentioned species closely allied to *C. aurita*—were both taken at Port Phillip Heads (MacGillivray, 1887C: 176-177) but do not occur in the Survey material.

Claviporella geminata (Wyville Thomson, 1858)

Catenicella geminata Wyville Thomson, 1858: 84, Pl. 7, figs. 3-4; MacGillivray, 1879: 26-27, Pl. 24, figs. 17-17b.
Claviporella geminata Levinsen, 1909: 242-243, Pl. 12, figs. 3a-b.

Survey area 58 (88), MacGill. Coll. area 58 Queenscliff.

'Of this species I have seen a few fragments from Port Phillip' (Levinsen 1909: 243).

Calpidium Busk, 1852

Calpidium ponderosum (Goldstein, 1880)

Catenicella ponderosa Goldstein, 1880: 63, Pl. 5, figs. 1-3.

Calpidium ponderosum MacGill., 1885D; 31-32, Pl. 107, figs. 3-3c; Levinsen, 1909: 249-251, Pl. 21, figs. 5a-c; Pl. 13, figs. 1a-d.

Survey area 59 (36), MacGill. Coll. area 58 Port Phillip Heads.

Calpidium ornatum (Busk) is taken at Port Phillip Heads, 'seemingly very rare' (MacGillivray 1885: 33-34, Pl. 108, figs. 1-1b).

Family CALWELLIIDAE MacGill., 1887

Calwellia Wyville Thomson, 1858

Calwellia bicornis Wyville Thomson, 1859

Calwellia bicornis Wyville Thomson, 1859: 92, Pl. 9, figs. 2-2a; MacGill., 1880: 35-36, Pl. 46, figs. 7-7b.

Survey areas 58 (88), 59 (36), MacGill. Coll. area 58 Queenscliff.

Calwellia gracilis Maplestone, 1882

Calwellia gracilis Maplestone, 1882: 48, Pl. 1, fig. 9.

Survey area 59 (36) MacGill. Coll. area 58 Queenscliff.

References

AUDOUIN, J. V., and SAVIGNY, M. J. C., 1826. Explication sommaire des planches de polypes de l' Egypte et de la Syrie. *Déscription de l' Egypte, Hist. Nat.* 1 (4). Explication sommaire des planches dont les dessins ont ets. journées par M. J. C. Savigny, 225-44.

————, 1828. Ibid., Ed. 2, 23.

BASSLER, R. S., 1953. *Bryozoa*, Treatise on Invertebrate Paleontology. Geol. Soc. Amer. and Univ. Kansas Press, 253 pp.

BROWN, D. A., 1952. *The Tertiary Cheilostomatous Polyzoa of New Zealand*. British Museum (Nat. Hist.), 405 pp.

BUSK, G., 1852. An account of the Polyzoa, and sertularian zoophytes. In MacGillivray, J., *Narrative of the Voyage of H.M.S. "Rattlesnake"*, 1. London. Append. 4: 342-402.

————, 1852a. Catalogue of marine Polyzoa in the collection of the British Museum, 1. Cheilostomata (part.) British Museum (Nat. Hist.) 54 pp.

————, 1854. Ibid., 2: 55-120.

————, 1861. Description of new Polyzoa collected by J. Y. Johnston, Esq., at Madiera. *Quart. J. Micr. Sci.* 1: 77-80. Description of new or imperfectly known Polyzoa. 2: 153-6.

————, 1875. Catalogue of marine Polyzoa in the British Museum, 3. Cyclostomata. British Museum (Nat. Hist.) 39 pp.

————, 1884. Report on the Polyzoa collected by H.M.S. "Challenger" 1873-1876. Pt. 1, Cheilostomata, Zool. 10 (30): 1-216.

————, 1886. Ibid. Pt. 2. The Cyclostomata, Ctenostomata, and Pedicellinea, Zool. 17 (50): 1-47.

CANU, F., and BASSLER, R. S., 1929. Bryozoa of the Philippine Region. *Bull. U.S. Nat. Mus.* 100 (9): 1-685.

CROUCH, R. Q., 1884. *A Cornish Fauna*, Pt. 3. The Zoophytes and calcareous Corallines. The Royal Institution of Cornwall.

GOLDSTEIN, J. R. Y., 1880. A new species of Polyzoa. *J. Micr. Soc. Vict.* 1 (2-3): 63.

GRAY, J. E., 1848. Centroniae or radiated animals. *List of the Specimens of British Animals in the British Museum* (Nat. Hist.), Pt. 1.

HARMER, S. F., 1915. The Polyzoa of the Siboga Expedition, Pt. 1. Entoprocta, Ctenostomata and Cyclostomata. *Siboga Expedition*, vol. 14, Monogr. 28a, 180 pp.

————, 1923. On Cellularine and other Polyzoa. *J. Linn. Soc. Lond.* (Zool.), 35: 293-361.

————, 1926. Ibid. Pt. 2. Cheilostomata Anasca. Ibid. vol. 15 Mongr. 28b: 181-501.

————, 1934. Ibid. Pt. 3. Cheilostomata Ascophora, 1. Family Reteporidae. Ibid. vol. 16. Monogr. 28c. 503-640.

————, 1957. Ibid. Pt. 4. Cheilostomata Ascophora 2. Ibid. vol. 16, Monogr. 28d: 641-1147.

HASTINGS, A. B., 1930. Cheilostomatous Polyzoa from the vicinity of the Panama Canal. *Proc. zool. Soc. Lond.* 47: 697-740.

————, 1932. The Polyzoa with a note on an associated hydroid. *Brit. Mus. (Nat. Hist.) Sci. Rept. Great Barrier Reef Exped.* 4 (12): 399-458.

————, 1941. The British species of *Scruparia*. *Ann. Mag. Nat. Hist.* 2 (7): 465-472.

HINCKS, T., 1880. *A history of the British marine Polyzoa*, 2 vols., London.

————, 1880a. Contribution towards a general history of the marine Polyzoa. 3, Foreign Cheilostomata (misc.) *Ann. Mag. nat. Hist.* 5 (6): 381-384.

————, 1881. Ibid. 5 (7): 156-161.

————, 1881a. Ibid. 6, Polyzoa from Bass's Straits, Ibid. 8: 1-14, 122-128.

————, 1882. Ibid. 9, Foreign Cheilostomata (misc.) Ibid. 9: 116-127.

————, 1882a. Ibid. 10, Ibid. 10: 160-170.

————, 1883. Ibid. 11, Foreign Cheilostamata (Australia and New Zealand), Ibid. 11: 193-202.

————, 1884. Ibid. 13, Polyzoa from Victoria and Western Australia. Ibid. 13: 363-369.

————, 1884a. Ibid. 14, Ibid. 14: 276-285.

————, 1885. Ibid. 15, Polyzoa from New Zealand and Australia, Ibid. 15: 244-254.

HUTTON, F. W., 1878. One Some S. Australian Polyzoa. *Pap. Proc. roy. Soc. Tasmania*, 1877. 23-25.

JELLY, E. C., 1889. *A synonymic catalogue of the recent marine Bryozoa including fossil synonyms*. London.

JOHNSTON, G., 1832. A descriptive catalogue of the recent zoophytes found on the coast of North Durham. *Trans. Nat. Hist. Soc. Northumberland* 2: 239-272.

KIRCHENPAUER, G. H., 1880. Ueber die Bryozoen-Gattung *Adeona*, *Abh. Naturw. Hamburg* 7: 1-24.

KIRKPATRICK, R., 1888. Polyzoa from Port Phillip, *Ann. Mag. Nat. Hist.* 6 (2): 12-21.
KRAUSS, C. F. F., 1837. *Beitrag zur Kenntnis der Corallinien und Zoophyten der Sudsee.* Stuttgart.
LAMOUROUX, J. V. F., 1816. *Histoire des Polypiers coralligènes flexibles, vulgairement nommés Bryozoa.* Caen.
————, 1824. Encyclopédie Méthodique, Livr. 45, Tome 2 (1). Paris.
LEVINSEN, G. M. R., 1909. *Morphological and systematic studies on the Cheilostomatous Bryozoa.* Copenhagen.
LINNAEUS, C., 1767. Holmiae. Zoophyta, Systema Naturae. Ed. 10, 1: 799-821. 1767A. Ibid. Ed. 12, 1: 1287-1327.
LIVINGSTONE, A. A., 1924. Studies on Australian Bryozoa, 1. *Rec. Aust. Mus.* 14: 189-212.
————, 1925. Ibid. 2, Ibid. 14: 301-305.
————, 1926. Ibid 3, Ibid. 15: 79-99.
————, 1926. Ibid. 4, Ibid. 15: 167-176.
————, 1927. Ibid. 5, Ibid. 16: 50-69.
————, 1928. Bryozoa from South Australia. *Rec. S. Aust. Mus.* 4: 111-124.
MACGILLIVRAY, P. H., 1860. On some Australian Polyzoa, *Trans. Phil. Vict.* 4: 1-2.
————, 1860a. Ibid. 4: 97-98.
————, 1860b. Notes on the Cheilostomatous Polyzoa of Victoria and other parts of Australia. Ibid. 4: 159-168.
————, 1869. Descriptions of some new genera and species of Australian Polyzoa. *Trans Proc. R. Soc. Vict.* 9: 126-148.
————, 1879. Polyzoa, in McCoy, *Prodr. Zool. Vict.* 3: 15-35.
————, 1879a. Ibid. 4: 21-40.
————, 1880. Ibid. 5: 27-52.
————, 1881. Ibid. 6: 27-46.
————, 1881a. On some new species of *Catenicella* and *Dictyopora*; and on *Urceolipora*, a new genus of Polyzoa. *Trans. Proc. R. Soc. Vict.* 17: 84-7.
————, 1882. Polyzoa, in McCoy, *Prodr. Zool. Vict.* 7: 23-31.
————, 1882a. Descriptions of new, or little known, Polyzoa, Pt. 1. *Trans. Proc. R. Soc. Vict.* 18: 115-121.
————, 1883. Ibid. Pt. 2. Ibid. 19: 130-138.
————, 1883a. Ibid. Pt. 3. Ibid. 19: 191-195.
————, 1883b. Ibid. Pt. 4. Ibid. 19: 287-293.
————, 1884. Ibid. Pt. 5. Ibid. 20: 103-113.
————, 1884a. Ibid. Pt. 6. Ibid 20: 126-8.
————, 1885. Ibid. Pt. 7. Ibid. 21: 92-99.
————, 1885a. Ibid. Pt. 8. Ibid. 21: 106-119.
————, 1885b. Polyzoa, in McCoy. *Prodr. Zool. Vict.* 8: 29-31.
————, 1885c. Ibid. 9: 29-34.
————, 1885d. Ibid. 10: 13-31.
————, 1885e. Ibid. 11: 17-36.
————, 1886. Ibid. 12: 63-73.
————, 1886a. Ibid. 13: 99-111.
————, 1886b. Descriptions of new, or little known, Polyzoa, Pt. 9. *Trans. Proc. R. Soc. Vict.* 22: 128-139.
————, 1886c. Ibid. Pt. 10. Ibid. 22: 1-4.
————, 1887b. Polyzoa, in McCoy, *Prodr. Zool.*
————, 1887a. Ibid. Pt. 12. Ibid. 23: 179-186.
————, 1887b. Polyzoa, in McCoy, *Prodr. Zool. Vict.* 14: 137-150.
————, 1887c. Ibid. 15: 173-188.
————, 1887d. A catalogue of the marine Polyzoa of Victoria. *Trans. Proc. R. Soc. Vict.* 23: 187-224.
————, 1888. Polyzoa in McCoy, *Prodr. Zool. Vict.* 16: 209-220.
————, 1888a. Ibid. 17: 241-253.
————, 1889. Ibid. 271-279.
————, 1889a. Ibid. 19: 307-323.
————, 1889b. On some S. Aust. Polyzoa, *Trans. R. Soc. S. Aust.* 12: 24-30.
————, 1890. An additional list of S. Aust. Polyzoa, Ibid. 13: 1-7.
————, 1890a. Polyzoa, in McCoy, *Prodr. Zool. Vict.* 20: 345-357.
————, 1890b. Descriptions of new, or little known, Polyzoa, Pt. 23. *Proc. R. Soc. Vict.* 2: 106-110.
————, 1891. Ibid. Pt. 14. Ibid. 3: 77-83.
————, 1895. A monograph of the Tertiary Polyzoa of Victoria, *Trans. R. Soc. Vict.* 4: 1-166.
————, 1895a. On the Australian species of *Amathia. Proc. R. Soc. Vict.* 7: 131-140.
MAPLESTONE, C. M., 1880. On a new species of Polyzoa. *J. micr. Soc. Vict.* 1: 64.
————. 1882. Observations on Living Polyzoa, *Trans. Proc. R. Soc. Vict.* 18: 48-51.
————, 1901. On a new name *Vittaticella*, for the Polyzoan genus *Caloporella* McG. Proc. R. Soc. *Vict.* 13: 201-203.
————, 1902. Further descriptions of the Tertiary Polyzoa of Victoria, Pt. 7. *Proc. R. Soc. Vict.* 14: 65-74.
————, 1904. Notes on the Victorian fossil Selenariidae, and descriptions of some new species. Ibid. 16: 207-217.
————, 1904a. Tabulated list of the fossil Cheilostomatous Polyzoa in the Victorian Tertiary deposits. Ibid. 17: 182-219.
————, 1905. Lord Howe Island Polyzoa. Ibid. 17: 386-390.
————, 1909. Polyzoa from the Gilbert Islands. Ibid. 21: 410-419.
————, 1909a. The results of deep-sea investigations in the Tasman Sea. The Expedition of H.M.C.S. "Miner", 5. The Polzoa. *Rec. Austr. Mus.* 7: 267-273.
————, 1910. On the growth and habits of Biporae. *Proc. R. Soc. Vict.* 23: 1-7.
————, 1910a. On a new species of *Cellepora* from the South Australian coast. Ibid. 23: 39-41.
————, 1910b. Observations on *Parmularia obliqua* and a fossil species. Ibid. 23: 42-43.
————, 1913. New or little-known Polyzoa. Ibid. 25: 357-362.
MILNE-EDWARDS, H. M., 1838. Memoire sur les Crisies. *Ann. Sci. Nat. Zool.* 2 (9).
NORMAN, A. M., 1864. On undescribed British Hydrozoa, Actinozoa and Polyzoa. *Ann. Mag. Nat. Hist.* 3 (13): 82-90.
d'ORBIGNY, A., 1839. Polypiers. *Voyage dans l'Amérque méridionale.*
————, 1841-7. Zoophytes. Ibid. 5 (4): 7-28; 1847, Atlas 9.
OSBURN, R. C., 1950. Bryozoa of the Pacific Coast of America, Pt. 1, Cheilostomata-Anasca. *Allan Hancock Pacific Expeditions* 14: 1-269.

————, 1952. Ibid. Pt. 2. Cheilostomata-Ascophora. Ibid. 14: 271-611.
————, 1953. Ibid. Pt. 3. Cyclostomata, Ctenostomata, Entroprocta and addenda. Ibid. 14: 613-841.
PALLAS, P. S. 1766. Elenchus Zoophytorum. Hague.
RYLAND, J. S., 1969. A nomenclatural index to *A history of the British Marine Polyzoa*, T. Hincks (1880). *Bull. Brit. Mus. Nat. Hist.* 17 (6).
POWELL, N. A., 1967. Polyzoa (Bryozoa)—Ascophora —from North New Zealand. *Discovery Rep.* 34: 199-394.
SAVIGNY, J. C., 1826. Polypes, Déscription de l'Egypte, *Commission d'Egypte France*. Tom. 1 (4) (see Audouin 1826).
SMITT, F. A., 1873. Floridan Bryozoa, Pt. 2. *K. svenska Vetensk. Akad. Handl.* 11 (4).
STACH, L. W., 1933. Victorian Tertiary Catenicellidae (Bryozoa), Pt. 1. *Proc. R. Soc. Vict.* 45: 85-98.
————, 1934. Ibid. Pt. 2. Ibid. 47: 18-53.
————, 1934a. Zooecial variation within species of the Catenicellidae, Ibid. 47: 14-17.
————, 1935. The genera of Catenicellidae. Ibid. 47: 389-396.
————, 1935a. Victorian Lower Pliocene Bryozoa, Pt. 1, Ibid. 47: 338-351.
————, 1935b. Victorian Tertiary Catenicellidae (Bryozoa), Pt. 3, Ibid. 48: 27-49.
————, 1935c. Notes on Recent Australian Bryozoa. 1. *Aust. Zool.* 8: 140-142.
————, 1936. Studies on Recent Petraliidae (Bryozoa). *Rec. Aust. Mus.* 19: 355-379.
————, 1936a. Goldstein's Nomina nuda of Catenicellidae (Bryozoa). *Mem. natn. Mus. Melb.* 10: 121-127.
————, 1936b. South Australian Cainozoic Bryozoa, 1. *Trans. R. Soc. S. Aust.* 60: 127-136.
————, 1936c. Correlation of zoarial form with habitat. *J. Geol.* 44: 60-65.
————, 1936d. An Upper Oligocene Bryozoan faunule. *Proc. R. Soc. Vict.* 49: 62-71.
————, 1937. The species of *Chiastosella* (Bryozoa). *Aust. Zool.* 8: 334-340.
————, 1937a. The application of the Bryozoa in Cainozoic stratigraphy. *Rep. 23rd Mtg. Aust. N.Z. Ass. Advmt Sci.* 80-83.
————, 1937b. Bryozoa of Lady Julia Percy Island. *Proc. R. Soc. Vict.* 49: 374-384.
————, 1938. Colony-formation in *Smittina papillifera* (MacGillivray, 1869) (Bryozoa). *Proc. R. Soc.* (London) 108B: 401-415.
TENISON-WOODS, J. E., 1877. On some Tertiary Australian Polyzoa. *J. R. Soc. N.S.W.* 10: 147-150.
————, 1880. On some recent and fossil species of Australian Selenaridae (Polyzoa). *Trans. Proc. R. Soc. S. Aust.* 3: 1-12.
————, 1880a. On the genus *Amathia*. *Trans. Proc. R. Soc. Vict.* 16: 97.
THOMSON, T. C. WYVILLE, 1858. On new genera and species of Polyzoa. *Nat. Hist. Rev. 5 (Proc. Soc.)*: 134-147.
————, 1859. Ibid. *Dublin Univ. Zool. Bot. Ass.* 1: 77-93.
VIGELAND, I., 1964. A preliminary report on the Polyzoa collection in The National Museum of Victoria. *Mem. natn. Mus. Vict.* 26: 167-199.
WATERS, A. W., 1881. On Fossil Cheilostomatous Bryozoa from South-West Victoria, Australia. *J. Geol. Soc. Lond.* 37: 309-347.
————, 1882. On fossil Cheilostomatous Bryozoa from Mount Gambier, South Australia. Ibid. 38: 257-276.
————, 1882a. On Cheilostomatous Bryozoa from Bairnsdale (Gippsland), Victoria. Ibid. 38: 502-513.
————, 1883. Fossil Cheilostomatous Bryozoa from Muddy Creek, Victoria. Ibid. 39: 423-443.
————, 1885. Cheilostomatous Bryozoa from Aldinga and the River Murray cliffs, South Australia. Ibid. 41: 279-310.
————, 1887. Bryozoa from New South Wales, North Australia, etc. Part 1. *Ann. Mag. Nat. Hist.* 5 (20): 81-95.
————, 1887a. Ibid. Part 2. Ibid. Pp. 181-203.
————, 1889. Bryozoa from New South Wales, Pt. 4. Ibid. 6 (4): 1-24.
————, 1889a. Supplementary report on the Polyzoa collected by H.M.S. Challenger during the years 1873-76, Pt. 79 (31): 1-41.
————. 1898. Observations on Membraniporidae. *J. Linn. Soc. (Zool).* 26: 654-693.
————, 1913. The marine fauna of British East Africa and Zanzibar. Bryozoa-Cheilostomata, *Proc. Zool. Soc. Lond.*, Pp. 458-537.
WISELY, B., 1958. The settling and some experimental reactions of a Bryozoan larva, *Watersipora cucullata* (Busk). *Aust. J. Mar. Freshw. Res.* 9 (3): 362-371.

TABLE 1

List of Species Discussed by MacGillivray in Prodromus of Zoology 1879-89

The species discussed by MacGillivray in McCoy's Prodromus are listed in alphabetical order with the author and date, followed by alterations from MacGillivray either due to generic change or change in synonomy.

Numbers 1-21 refer to the localities from which MacGillivray recorded the various species:

1. Port Phillip Heads
2. Queenscliff
3. Sorrento
4. Spring Creek near Geelong.
5. Schnapper Point, Mornington
6. Point Cook
7. Brighton
8. Williamstown
9. Hobsons Bay
10. Portland
11. Lady Bay, Portland
12. Port Fairy
13. Warrnambool
14. Cape Otway
15. Lorne
16. King Island
17. Cape Schank

18. Western Port
19. Wilsons Promontory
20. Sealers Cove
21. Widespread, usually common

Species collected on the 1957-63 Port Phillip Survey are preceded by an asterisk.

* *Aetea anguina* (Linneaus, 1758) 1
Aetea dilatata Busk, 1852 1
* *Aetea recta* Hincks, 1880 = *Aetea sica* (Couch, 1844) 1
* *Amathia australis* Tenison Woods, 1877 1
A. bicornis Tenison Woods, 1878 1
* *A. inarmata* MacGill., 1887 1
A. spiralis Lamouroux, 1816 1
* *A. tortuosa* Tenison Woods, 1880 1, 20
Amphiblestrum albispinum MacGill., 1881 2, 10
A. flemingii Bus, 1854 1
A. patellarium Waters, 1879 1
A. permunitum Hincks, 1881 1, 10
A. punctigerum Hincks, 1881 1
Bathypora porcellana MacGill., 1884 10
Beania conferta MacGill., 1890 1, 10
* *B. costata* (Busk, 1884) 1
B. crotali (Busk, 1852) 1, 10
B. decumbens MacGill., 1881 1
B. intermedia Hincks, 1881 1
B. mirabilis Johnston, 1840 1
B. radicifera (Hincks, 1881) 1
B. wilsoni MacGill., 1884 1
Bicellaria ciliata (Linnaeus, 1858) 2, 10
* *B. grandis* = *Corucopina grandis* (Busk, 1852) 2 14
* *B. tuba* = *C. grandis tuba* (Busk, 1852) 2, 10, 18
B. turbinata MacGill., 1869 2
Biflustra bimamillata (MacGill., 1885) 10
B. delicatula Busk, 1859 2
* *B. papuifera* = *Membranipora papulifera* (MacGill., 1881) 1
* *B. perfragilis* = *M. perfragilis* (MacGill., 1881) 1, 16
Bracebridgia pyriformis (Busk, 1886) 21
Bugula avicularia Pallas, 1766 9
B. cucullata Busk, 1867 2, 10
* *B. dentata* (Lamouroux, 1816) 2, 9,
* *B. neritina* (Linnaeus, 1758) 2, 9, 13
B. robusta MacGill., 1869 18
* *Caberea darwinii* Busk, 1852 1, 10
* *C. glabra* MacGill., 1886 1
* *C. grandis* Hincks, 1881 1
* *C. rudis* = *Amastigia rudis* (Busk, 1852) 1, 10
* *Caleschara denticulata* (MacGill., 1869) 2, 5, 13
Calpidium ornatum Busk, 1852 1
* *C. ponderosum* (Goldstein, 1880) 1
* *Cawellia bicornis* Wyville Thomson, 1859 2
* *Canda arachnoides* Lamouroux, 1816 1, 10
C. tenuis MacGillivray, 1885 1
* *Carbasea dissimilis* = *Bugula dissimilis* (Busk, 1852) 2, 16
C. elegans Busk, 1852 2, 10
* *C. episcopalis* = *Euthyroides episcopalis* (Busk, 1852) 2, 16
C. indivisa Busk, 1852 2, 10, 13-14
C. pisciformis Busk, 1852 2, 10
* *Catenicella alata* = *Pterocella alata* (Wyville Thomson, 1858) 2
C. amphora Busk, 1852 1
* *C. aurita* = *Claviporella aurita* (Busk, 1852 21
* *C. buskii* = *Vittaticella buskii* (Wyville Thomson, 1858) 21, rare
C. carinata Busk, 1852 21, rare
* *C. cornuta* = *Cornuticella cornuta* (Busk, 1852) 2
C. cribraria Busk, 1852 2, 18, 20
C. crystallina Wyville Thomson, 1858 21 1852) 21
C. formosa Busk, 1852 2, 17
C. fusca MacGill., 1885 2
C. gemella MacGill., 1886 1
* *C. geminata* = *Claviporella geminata* (Wyville Thomson, 1858) 2
C. gracilenta MacGill., 1884 1
* *C. hastata* = *Costaticella hastata* (Busk, 1852) 2, 14, 18
C. hannafordi MacGill., 1868 11
C. intermedia MacGill., 1868 1, 2
* *C. lorica* = *Scuticella lorica* (Busk, 1852) 2
* *C. margaritacea* = *S. margaritasea* (Busk, 1852) 21
* *C. perforata* = *Vitaticella perforata* (Busk, 1853) 21, rare
* *C. plagiostoma* = *Scuticella plagiostoma* (Busk, 1852) 21
C. pulchella Maplestone, 1880 1, 2
C. ringens Busk, 1852 1
C. rufa MacGill., 1868 21
C. umbonata Busk, 1852 1
C. urnula Macgill., 1886 1
C. utriculus MacGill., 1885 13
* *C. ventricosa* = *Scuticella ventricosa* (Busk, 1852) 21
C. venusta MacGill., 1886 1
C. wilsoni MacGill., 1880 1
Catenicellopsis delicatula Wilson, 1880 14
C. pusilla Wilson 1880 4
Cellaria fistulosa (Linnacus, 1758) 2, 10
* *C. gracilis* (Busk, 1852) = *Cellaria punctata* (Busk, 1852) 2, 20
* *C. hirsuta* (MacGill., 1869) 2, 10
C. rigida MacGill., 1884 1
* *C. tenuirostris* (Busk, 1852) 2, 20
* *Cellepora albirostris* = *Celleporaria albirostris* (Smitt, 1873) 1
C. benemunita MacGill., 1887 1
C. bispinata Busk, 1854 1, 10, 13
C. cidaris MacGill., 1888 1
C. costata MacGill., 1868 1, 10, 13, 19
* *C. costazei* = *Celleporina costazii* (Audouin, 1826) 1
C. diadema MacGill., 1888 1
* *C. foliata* = *Celleporaria foliata* (MacGill., 1888) 10
C. fusca Busk, 1854 10
C. glomerata MacGill., 1887 1
C. intermedia MacGill., 1868 2
C. lirata MacGill., 1888 1
C. magnirostris MacGill., 1888 1
C. megasoma (MacGill., 1879) 1
C. platalea MacGill., 1884 1
* *C. prolifera* = *Celleporaria prolifera* (MacGill., 1888) 10
C. rota MacGill., 1884 1

C. serratirostris MacGill., 1884 1
C. simplex MacGill., 1888 1
C. speciosa MacGill., 1886 1
C. spicata MacGill., 1888 1
C. tiara MacGill., 1887 1
C. tridenticulata Busk, 1884 1, 13
* *C. verrucosa* = *Celleporaria verrucosa* MacGill., 1888 10
C. vitrea MacGill., 1887 1
* *Cellularia cuspidata* = *Bugulopsis cuspidata* (Busk, 1852) 2
Childonia daedala Wyville Thomson, 1858 21
Claviporella imperforata MacGill., 1886 1
C. pulchra MacGill., 1886 1
Craspedozoum ligulatum MacGill., 1885 1
C. roboratum Hincks, 1881 1
C. spicatum McGill., 1885 1
Cribrilina acanthoceros MacGill., 1886 1, 10
C. monoceros Busk, 1854 1, 10, 13
C. radiata (Moll, 1803) 1
C. setirostris MacGill., 1882 1
* *Crisia acropora* Busk, 1852 2, 8
C. biciliata MacGill., 1869 8, 13
* *C. edwardsiana* (d'Orbigny, 1839) 8
C. setosa MacGill., 1868 2, 8
* *C. tenuis* MacGillivray, 1879 2
Cyclicopora longipora (MacGill., 1882) 1
Diachoris magellanica = *Beania magellanica* (Busk, 1852) 10
D. spinigera = *B. spinigera* (MacGill., 1860) 2, 10, 19
Diastopora bicolor MacGill., 1889 1
D. capitata MacGill., 1886 1
D. patina Lamarck, 1816 1
D. cristata MacGill., 1886 1
* *D. sarniensis*, ? *Berenicea sarniensis* (Norman, 1864) 1
Dictyopora albida avicularis MacGill., 1881 1
* *D. cellulosa* = *Adeonella cellulosa* (MacGill., 1869) 2
* *D. grisea* = *Adeona grisea* Lamouroux, 1816 1
* *D. wilsoni* MacGill., 1881 1
* *Didymia simplex* = *Didymozoum simplex* (Busk, 1852) 2, 10
Dimetopia cornuta Busk, 1852 2, 10, 19
D. hirta MacGill., 1885 1
D. spicata Busk, 1852 2, 10, 14
Electra amplectens (Hincks, 1881) 1
E. flagellum (MacGill., 1881) 2
Eschara dispar Macgill., 1869 2
* *E. gracilis* = *Adeonella gracilis* (Lamouroux, 1824) 2
* *E. mucronata* = *Adeonellopsis mucronata* (MacGill., 1869) 2, 5
E. obliqua MacGill., 1869 5
E. platalea Busk, 1854 2
E. quadrata MacGill., 1879 2, 10
Escharipora stellata Smith, 1873 1
Farcimia appendiculata Hincks, 1883 1
Farciminaria aculeata Busk, 1852 1
F. simplex MacGill., 1885 1
F. uncinata Hincks, 1884 1
Fasciculipora bellis MacGill., 1883 1
F. fruticosa MacGill., 1883 1
F. gracilis MacGill., 1882 1
F. ramosa (d'Orbigny, 1850) 10
Flosciculipora pygmaea MacGill., 1886 1
**Flustra denticulata* = *Spiralaria denticulata* (Busk, 1852) 2
Gemellipora striatula Smitt, 1873 1
Hippothoa distans MacGill., 1869 1, 9
H. divaricata Busk, 1852 1, 9
* *Hornera foliacea* MacGill., 1869 1, 10, 18, 20
H. robusta MacGill., 1882 1
* *Idmonea australis*, ? *Idmidronea australis* (MacGill., 1884) 1
I. milneana d'Orbigny, 1847 1
I. radians Lamarck, 1816 2, 8, 10
Lagenipora nitens MacGill., 1886 1
L. tuberculata MacGill., 1882 1
Lekythopora hystrix MacGill., 1882 1
Lepralia anceps MacGill., 1879 13
L. botryoides MacGill., 1879 8
L. brogniartii Audouin, 1826 2
L. canaliculata MacGill., 1859 2
L. cecilii Audouin, 1826 2, 13
L. cheilodon MacGill., 1869 8
* *L. ciliata* = *Microporella ciliata* (Pallas, 1766) 2, 12, 13
L. circinata MacGill., 1869 2
L. diadema MacGill., 1869 2, 8, 13
L. diaphana MacGill., 1879 2, 13
L. elegans MacGill., 1859 2, 8
* *L. ellerii* = *Mucropetraliella ellerii* (MacGill., 1869) 8, 13
L. excavata MacGill., 1860 2
* *L. ferox* = *Hiantopora ferox* (MacGill., 1869) 2, 8
L. larvalis MacGill., 1868 8
L. lunata MacGill., 1859 2
* *L. malusii* = *Fenestrulina malusii* (Audouin, 1826) 2
2
L. maplestonei MacGill., 1879 8
L. marsupium MacGill., 1868 21
L. megasoma MacGill., 1868 2
* *L. monoceros* = *Arachnopusia monoceros* (Busk, 1854) 2, 13
* *L. mucronata* MacGill., 1869 = *Adeonellopsis mucronata* (MacGill., 1869) 2, 5
L. papillifera MacGill., 1868 8
L. pellucida MacGill., 1879 2, 8
L. pertusa Esper., 1790 9
L. schizostoma MacGill., 1868 2, 8
L. subimmersa MacGill., 1879 13
L. trifolium MacGill., 1868 2, 8, 18
L. vitrea MacGill., 1879 8
L. vittata MacGill., 1868 18
Lichenopora bullata MacGill., 1886 1, 10, 13
L. magnifica MacGill., 1886 1
Maplestonia cirrata MacGill., 1884 1, 10, 13
Membranipora cervicornis Busk, 1854 8
M. ciliata MacGill., 1868 2, 8, 10
M. corbula Hincks, 1880 1, 10
M. dispar MacGill., 1868 10
M. inarmata Hincks, 1881 1
* *M. lacroixii* MacGill. (non Savigny) = *Conopeum reticulum* (Linnaeus, 1767) 2, 6, 7
* *M. lineata* MacGill., 1879 (non Linnaeus = *Pyrulella pyrula* (Hincks, 1881) 2, 12
M. mamillaris = *Thairopora mamillaris* (MacGill., 1860) 2
M. membranacea 1879 (Linnaeus, 1767) 21

M. pectinata MacGill., 1886 1
M. perforata MacGill., 1859 2
M. pilosa Linnaeus, 1867 21
M. pyrula = *Pyrulella pyrula* (Hincks, 1881) 1, 10
M. rosselii Audouin, 1826 21
M. serrata MacGill., 1881 1
M. spinosa d'Orbigny, 1847 21
M. umbonata Busk, 1854 2
M. woodsii MacGill., 1868 10
Membraniporella distans MacGill., 1882 1, 13
Menipea buskii Wyville Thomson, 1858 2
M. cervicornis MacGill, 1868 2
* *M. crystallina* Gray 1843 2
M. cyathus Wyville Thomson, 1858 2
M. funiculata MacGill., 1885 1
M. tricellata Busk, 1852 2
Micropora coriacea Esper., 1790 21
Microporella ciliata var. *spicata* MacGill., 1889 21
M. ,, var. personata Busk, 1854 21
M. diadema MacGill., 1884 21
M. malusii var. *personata* MacGill., 1883
M. malusii var. *thyreophora* Busk, 1861 21
M. renipuncta MacGill., 1882 1
M. scandens MacGill., 1884 1
Mucronella laevis MacGill., 1882 1, 3
M. tricuspis Hincks, 1881 1, 10
M. vultur Hincks, 1882 1, 10, 13
Nellia oculata Busk, 1852 2
Petralia undata MacGill., 1868 2, 10
Poecilopora anomola MacGill., 1886 1
Pyripora catenularia (Jameson, 1828) 1, 7
P. crassa (MacGill., 1868) 2
P. polita (Hincks, 1880) 2
Retepora aurantiacea MacGill., 1882 1
* *R. avicularis* MacGill., 1882 1
R. carinata MacGill., 1883 1
R. fissa MacGill., 1869 21
R. formosa MacGill., 1883 1
R. granulata MacGill., 1869 1
* *R. monilifera* f. *monilifera* 1885, = *Triphyllozoon monilifera* (MacGill., 1860) 1, 10, 13
R. monilifera f. *munita* Hincks, 1878 21
R. monilifera f. *umbonata* MacGill., 1885 1
R. phaenicea Busk, 1854 1, 10, 16
R. porcellana MacGill., 1869 1
R. serrata MacGill., 1882 1
* *R. tessellata* = *Schizoretepora tessellata* (Hincks, 1878) 1
Rhabdozoum wilsoni Hincks, 1882 1
Rhynchopora bispinosa Johnston, 1881 1
* *R. longirostris* Hincks, 1881 = *Rhynchozoon tubulosum* (Hincks, 1880a) 1, 10, 13
Schizoporella arachnoides McGill., 1882 1
S. biturrita Hincks, 1884 1
S. cryptostomata MacGill., 1884 1
S. daedala MacGill, 1882 21
S. hyalina = *Celleporella hyalina* (Linnaeus, 1767) 21
S. lata MacGill., 1882 1
S. latisinuata Hincks, 1882 1
S. pachnoides MacGill., 1886 1
S. pulcherrima MacGill., 1885 1
S. punctigera MacGill., 1883 1
S. ridleyi MacGill., 1882 1
S. rostrata MacGill., 1887 1
S. subsinuata Hincks, 1884 1
S. triangula Hincks, 1881 1
S. woosteri MacGill., 1886 2
* *Scruparia chelata* MacGill., 1889 (non Linnaeus) = *Scruparia ambigua* (d'Orbigny, 1841) 1
* *Scrupocellaria cervicornis* MacGill. = *Scrupocellaria diadema* Busk, 1852 21
* *S. cylostoma* Busk, 1852 1, 10
S. obtecta Haswell, 1883 1
S. ornithorhynchus Wyville Thomson, 1858 21
S. scrupea Busk, 1852 1, 10
* *Smittia reticulata* Hincks, 1881 21
* *S. reticulata spathulata* MacGill., 1883 = *Parasmittina macphersonae* Powell, 1957 1
Spiralaria florea Busk, 1861 2
* *Steganoporella magnilabris* (Busk, 1854) 2, 10
Stirparia annulata Maplestone, 1879 10, 18
S. glabra Hincks, 1883 15
* *Stomatopora geminata* MacGill., 1886 21
Tessaradoma magnirostris MacGill., 1882 1
Thairopora armata MacGill., 1881 2
T. jervoisii (Hincks, 1880) 3
* *T. mamillaris* (MacGill., 1860) 2
Tubucellaria cereoides (Ellis and Solander, 1786) 1
* *T. hirsuta* = *Margaretta hirsuta* Lamouroux, 1816 2, 10, 14, 18
Urceolipora dentata MacGill., 1884 1
U. nana MacGill., 1885 1
* *Verrucularia dichotoma* (Busk, 1885) = *Elzerina blainvillii* Lamouroux, 1816 1

7

CORALLIMORPHARIA, ACTINIARIA AND ZOANTHIDEA

By CHARLES E. CUTRESS

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Abstract

The collection of sea anemones from Port Phillip, Victoria, consists of 15 species, including one corallimorpharian, 12 actiniarians and two zoanthideans. Three are described as new species: *Isophellia stela* (Actiniaria: Isophellidae), *Parazoanthus lividum* (Zoanthidea: Parazoanthidae), and *Epizoanthus sabulosum* (Zoanthidae: Epizoanthidae). Ten species constitute new records for Port Phillip Bay.

Introduction

The collection of sea anemones resulting from the Port Phillip Bay Survey apparently is by far the largest and richest ever to come from the area. Represented in the collection are one corallimorpharian, 12 actiniarians (one new species), and two zoanthideans (both new species).

Five species of Actiniaria and one corallimorpharian had previously been reported from Port Phillip Bay. Haddon and Duerden (1896) described *Actiniodes spenceri, Sagartia carlgreni, Mitactis australiae, Mitactis similis* and *Corynactis autralis*. The first is now recognized as an *Actiniogeton*, the last retains Haddon and Duerden's names, and the other three are probably synonyms of *Anthothoë albocincta*. Duerden (1895) vaguely refers to *Cystiactis tuberculosa* (now *Phlyctenactis*) from Port Phillip. Since two of these species, *Corynactis australis* and *Phlyctenactis tuberculosa*, are included in the collection under consideration, there are then 16 species known from Port Phillip Bay. For an area the size of Port Phillip, this is an average sea anemone fauna.

Of the 15 species in the 1957-1963 survey collection, the three new species plus *Epiactis australiensis, Phlyctenanthus australis* and *Isanemonia australis* are known only from southern Australia. Six other species had previously been reported from southern Australia: *Corynactis australis, Actinia tenebrosa, Oulactis muscosa, Anthopleura aureoradiata, Phlyctenactis tuberculosa*, and *Anthothoë albocincta*. Three species, *Epiactis thomsoni, Bunodactis rubrofusca and Cricophorus nutrix*, were previously known only from New Zealand and, in addition to the three new species, represent new records for southern Australia (Port Phillip Bay). On the basis of the present analysis, it is apparent that the Port Phillip Bay sea anemone fauna is for the greater part related to that of New Zealand (nine species) and to a lesser extent possibly endemic (seven species). No species that might be considered subtropical appeared in the collection.

Three papers by Carlgren (1950a, 1950b, 1954), dealing with southern Australian anemones, give good accounts of several of the species included in this report. I have, therefore, simply listed these species along with references and collection data, adding comments in only a few instances.

Holotypes of the three new species described in this paper are deposited in the National Museum of Victoria.

I am indebted to Mrs Hope Macpherson Black of the National Museum of Victoria for providing the specimens and data upon which this report is based, to Mr David A. West, Department of Marine Sciences, University of Puerto Rico, Mayaguez, for the photographs, and my wife, Bertha, for lending a hand, as always where needed.

Contribution, Department of Marine Sciences, University of Puerto Rico, Mayaguez, P.R. 00708.

Distribution of Anemones

Area	(Loc.)	Spec.	Species
5	(58)	1	*Oulactis muscosa*
	(Williamstown, intertidal)	3	*Oulactis muscosa*
6	(65)	2	*Parazoanthus lividum*
7	(123	2	*Isophellia stela*
9	(84)	17	*Oulactis muscosa*
		11	*Anthopleura aureoradiata*
10	(12)	2	*Corynactis australis*
10	(103)	7	*Anthothoë albocincta*
12	(112)	1	*Corynactis australis*
13	(93)	3	*Epiactis thomsoni*
18	(61)	3	*Epiactis thomsoni*
19	(304	1	*Corynactis australis*
23	(3)	7	*Epiactis thomsoni*
24	(122)	2	*Oulactis muscosa*
25	(129)	7	*Anthothoë albocincta*
27	(41)	1	*Epiactis thomsoni*
27	Point Wilson, intertidal)	20	*Anthopleura aureoradiata*
		1	*Oulactis muscosa*
29	(107)	5	*Anthothoë albocincta*
30	(280)	1	*Phlyctenactis tuberculosa*
33	(177)	1	*Isophellia stela*
42	(38)	1	*Oulactis muscosa*
		1	*Epiactis thomsoni*
		3	*Bunodactis rubrofusca*
43	(303)	3	*Anthothoë albocincta*
47	(29)	1	*Phlyctenactis tuberculosa*
55	(35)	2	*Epiactis australiensis*
55	(Mornington, intertidal)	1	*Epiactis thomsoni*
55	(Southside Schnapper Point, intertidal)	4	*Isanemonia australis*
58	(90)	1	*Phlyctenanthus australis*
58	(79)	20	*Actinia tenebrosa*
58	1(293)	colony	*Epizoanthus sabulosum*
58	(Point Lonsdale	2	*Isanemonia australis*
59	(Quarantine Jetty, intertidal)	7	*Actinia tenebrosa*
		9	*Anthothoe albocincta*
		2	*Isanemonia australis*
59	(23)	1	*Epiactis thomsoni*
59	(24)	1	*Anthothoë albocincta*
59	(25)	1	*Phlyctenactis tuberculosa*
		2	*Anthothoë albocincta*
59	(36)	1	*Cricophorus nutrix*
		17	*Actinia tenebrosa*
59	(80)	9	*Anthothoë albocincta*
61	(37)	44	*Anthothoë albocincta*
63	(Safety Beach, intertidal)	11	*Oulactis muscosa*
69	(Rosebud, intertidal)	1	*Oulactis muscosa*
		13	*Anthopleura aureoradiata*
		8	*Cricophorus nutrix*
(Label macerated—Victoria 21/6/62)		4	*Anthopleura aureoradiata*

Description of Species

Order Corallimorpharia

Family Corallimorphidae

Corynactis australis Haddon and Duerden

Corynactis australis Haddon and Duerden, 1896; 151, Pl. 7, fig. 6-10, Pl. 8, fig. 9-10; Carlgren, 1949: 14; Carlgren, 1950b: 131.

Survey areas 10 (12) 2, 12 (112) 1, 19 (304) 1.

Order Actiniaria

Family Actiniidae

Actinia tenebrosa Farquhar

Actinia tenebrosa Farquhar, 1898: 535; Stuckey, 1909c: 375, 380, Fig. 5, Pl. 23, fig. 1-2; Stuckey and Walton, 1910: 541; Stephenson, 1922: 266; Carlgren, 1924: 196, Fig. 14; Carlgren, 1949: 50; Carlgren, 1950a: 2; Carlgren, 1950b: 132; Parry, 1951: 87, 100; Carlgren, 1954: 571.

Survey areas 58 (79) 20, 59 (Quarantine Jetty, intertidal) 7, 59 (36) 17.

Oulactis muscosa (Drayton in Dana)

Metridium muscosum Drayton in Dana, 1846: 153; 1849 (atlas): 3, Pl. 5, fig. 42, 43; Dana, 1859: 12.

Oulactis muscosa, Milne Edwards and Haime, 1851: 12; Milne Edwards, 1857: 292; Andres, 1883: 311; Carlgren, 1949: 52; Carlgren, 1950a: 3; Carlgren, 1950b: 134, Fig. 2, Pl. 2; Parry, 1951: 87, 102.

Oulactis plicatus Hutton, 1879: 311; Farquhar, 1898: 527.

Cradactis plicatus, Stuckey, 1909c: 376, 392, Pl. 25, fig. 1-2; Stephenson, 1922: 284.

Survey areas A-5 (58) 1, 5 (Williamstown, intertidal) 3, 9 (84) 17, 24 (122) 2, 27 (Point Wilson, intertidal) 1, 42 (38) 1, 63 (Safety Beach, intertidal) 11, 69 (Rosebud, intertidal) 1.

The three largest specimens from area 63, having lengths of 25 mm and diameters of 20 and 15 mm, all have 96 tentacles and 48 pairs of mesenteries of which all were fertile except the directives and youngest cycle. The entoderm of the tentacles, oral disc and upper column is coloured dark sepia from abundant zooxanthellae. The marginal sphincter is weak and diffuse in all three area 63 specimens but in others from Anglesea the sphincter varied from weak, diffuse, to moderately strong, circumscript. Nematocysts of the marginal spherules of the area 63 specimens were holotrichs 40-50 $\times$ 4-5 μ and spirocysts, 28 $\times$ 2 μ.

Anthopleura aureoradiata (Stuckey)

Bunodes aureoradiata Stuckey, 1909a: 368, Pl. 17; Stuckey, 1909c; 376, 394.
Anthopleura aureoradiata, Carlgren, 1924: 208, Fig. 17; Carlgren, 1949: 54; Carlgren, 1950a: 3; Parry, 1951: 88, 104, Figs. 5-6; Carlgren, 1954: 574, Fig. 3.

Survey areas 9 (84) 11, 27 (Point Wilson, intertidal) 20, 69 (Rosebud, intertidal) 13, label macerated (Victoria 21 Feb. 62) 4.

The anemones from the lot with the macerated label were attached to the bivalve *Katelysia scalarina*. The largest specimen measured 20 mm in length by 8 mm in diameter and contained several 12 to 14-tentacled young among the mesenteries.

Epiactis australiensis Carlgren

Epiactis australiensis Carlgren, 1950a; 5, Fig. 2; Carlgren, 1954: 576.

Survey area 55 (35) 2.

Epiactis thomsoni (Coughtrey)

Actinia thomsoni Coughtrey, 1874: 280.
? *Actinia thomsoni*, Hutton, 1879: 313; Farquhar, 1898: 527.
Leiotealia thompsoni, Stuckey, 1909b: 370, Pl. 18, fig. 1-2, Pl. 19, fig. 1-3; Stuckey, 1909c: 376, 395.
Epiactis thompsoni, Stephenson, 1922: 274; Carlgren, 1924: 221, Fig. 25; Parry, 1951: 88, 111.
Epiactis thomsoni, Carlgren, 1949: 58.

Survey areas 13 (93) 3, 18 (61) 3, 23 (3) 7, 27 (41) 1, 42 (38) 1, 55 (Mornington, intertidal) 1, 59 (23) 1.

The specimens from Port Phillip agree closely with the descriptions given by Carlgren (1924) and Parry (1951). A large specimen from area 55 contained a number of 12-tentacled young in the marginal stoma.

Phlyctenactis tuberculosa (Quoy and Gaimard)

Actinia tuberculosa Quoy and Gaimard, 1883: 159, Pl. 11, fig. 3-6.
Cereus tuberculosus, Milne-Edwards, 1857: 268.
Cystiactis tuberculosa, Haddon and Duerden, 1896: 156, Pl. 7, fig. 11, Pl. 9, fig. 1-3; Duerden, 1895: 213; Lager, 1911: 217; Stephenson, 1922: 286.
Phlyctenactis retifera Stuckey, 1909s: 376, 396, Pl. 26, fig. 1-2.
Phlyctenactis morrisonii Stuckey, 1909c: 396, Pl. 27, fig. 1.
Phlyctenactis tuberculosa, Carlgren, 1945: 13; Cargren, 1949: 61; Carlgren, 1950a: 136, Fig. 6; Carlgren, 1954: 578, Fig. 8; Parry, 1951: 88, 113.

Survey areas 30 (280) 1, 47 (29) 1, 59 (25) 1.

Phlyctenanthus australis Carlgren

Phlyctenathus australis Carlgren, 1950b: 135, Fig. 3-5, Pl. 1; (nomen nudum) Carlgren, 1949: 61.

Survey area 58 (90) 1.

Bunodactis rubrofusca Carlgren

Bunodactis, rubro-fusca Carlgren, 1924: 204, Fig. 15-16; Carlgren, 1949: 65.
Bunodactis rubrofusca, Parry, 1951: 88, 115.

Survey area 42 (38) 3.

Isanemonia australis Carlgren

Pl. 9, fig. 2

Isanemonia australis Carlgren, 1950a: 7, Fig. 3; Carlgren, 1954: 575, Fig. 4-5.

Survey areas 55 (Southside Schnapper Point, intertidal) 4, 58 (Point Lonsdale, intertidal) 2, 59 (80) 2.

The Port Phillip Bay specimens seem to differ in several ways from the specimens described by Carlgren (1950a, 1954). It is chiefly these differences that are described here. As the species has never been illustrated, a photograph of the best preserved specimen is included (Pl. 9, fig. 2). The three largest specimens examined had column heights, oral disc diameters and pedal disc diameters, respectively and in centimeters, of 3, 3, 2; 3, 3·5, 2·5; 5, 5, 6. The tentacles numbered 140 ($\pm$ 5), and the longest measured 3 cm. This is certainly not consistent with Carlgren's diagnosis of the genus: 'tentacles not very numerous, of moderate length'. Although these specimens were as large or larger than Carlgren's and well-expanded, I could not detect marginal pseudospherules which the species is said to have. The entodermal sphincter muscle of the sectioned specimen is somewhat stronger than that depicted by Carlgren (1950a, Fig. 3a) but is comparable to that illustrated later by Carlgren (1954, Fig. 4). The sphincter extends for about 3 mm along the wall of the deep fosse and consists of 120 or more mesogloeal pleats (300 μ high) many of which are branched. The mesogloea is fibrous and cellular throughout. The sectioned specimen is a ripe male. The numbers of mesenteries are exactly the same at the margin and base. Nematocysts examined are: spirocysts of tentacles, 30 $\times$ 2 μ; holotrichs of limbus, 25-26 $\times$ 5 μ; microbasic b-mastigophores of limbus, 21 $\times$ 2·5 μ; of filaments, 35 $\times$ 5 μ; of actinopharynx,

28-30 × 4·5 μ; of tentacles, 28-30 × 3 μ; microbasic p-mastigophores of filaments, 20 × 5 μ; of actinopharynx, 24-25 × 5-6 μ.

Family ISOPHELLIDAE

Isophellia stela n.sp.

Fig. 1, Pl. 9, fig. 1

MATERIAL: Survey areas 7 (123) 2, 33 (177) 2.

HOLOTYPE: Nat. Mus. Vict. G1547. Three Paratypes G1548.

TYPE LOCALITY: Off Middle Brighton.

DESCRIPTION: The specimens from area 33 are both strongly contracted, and in this state both have total lengths and greatest diameters of 10 × 5 mm. They are attached to tough, white fibrous material, probably a polychaete tube. The specimens from area 7 are both well expanded and have total lengths of 20 mm and greatest diameters of 7 mm.

The column is divisible into a short, distinct, clean, thin-walled scapulus and a thick-walled scapus bearing prominent tenaculi in its distal half. The contracted specimens have sand grains adhering to the tenaculi while the expanded specimens are free of sand. The columns of all specimens are constricted just above the pedal discs, this being more evident in the contracted specimens. Cinclides were not evident.

The tentacles are thin, evenly-tapered and acute. The inner are up to 6 mm in length and are twice or more the length of the outer. There are 80 (± 2) tentacles on each of the two specimens. Considering the number of mesenteries, it is likely that the definitive number of tentacles would be 96.

Ectoderm of column 30 to 75 μ high, with a few gland cells containing neutrophilic granules but lacking mucous cells. A surface cuticle seems to be lacking even on the tenaculi.

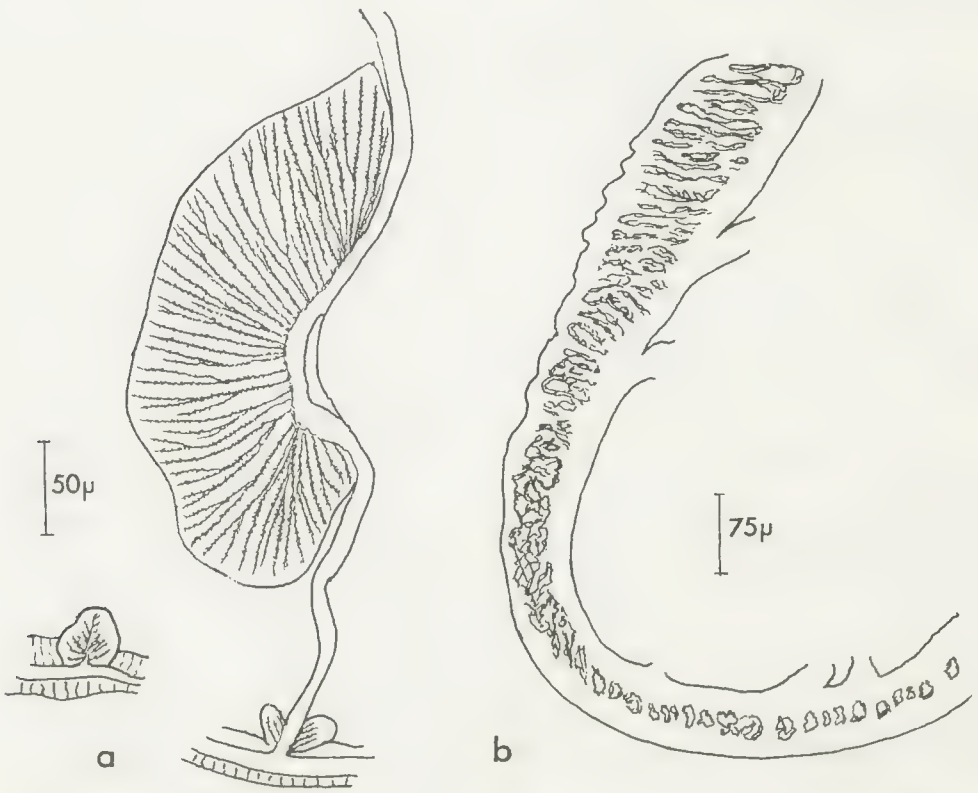


Fig. 1—*Isophellia stela* n. sp., *a*, second cycle macrocneme and a microcneme; *b*, marginal sphincter (only mesogloea shown).

Entoderm of the column 12 to 25 μ high, with a few gland cells and no zooxanthellae. Circular muscle layer of column folded into pleats 25 μ high near margin and diminishing to 6 to 8 μ at mid column. Radial muscles of oral disc and longitudinal muscles of tentacles ectodermal.

Mesogloea fibrous and cellular throughout, that of the mid column 12 to 40 μ thick. Marginal sphincter in the mesogloea strong, stratified near the margin and gradually becoming alveolar down the column. The sphincter, in section, is about 700 μ long by 75 μ at its greatest width. In its upper portion it occupies most of the width of the mesogloea but in its lower portion, only about one third.

Mesenteries are distinctly divisible into macrocnemes and microcnemes. Twenty-four pairs of mesenteries extend from pedal disc to oral disc. Of these the first cycle (two pairs directives) and most of the second are macrocnemes and are perfect and fertile. The retractor muscles of the second cycle mesenteries are slightly weaker than those of the first cycle. In addition, one member of each pair of second cycle mestenteries is noticeably weaker than the other and is always the same member with respect to the directive axis. In the sectioned specimens one member of a second cycle pair is an imperfect, very weak macrocneme while a member of another pair is a microcneme. The retractor muscles of the macrocnemes are very strong and of the restricted type. The stronger are made up of 40 or more high pleats of which many are branched. The parietal muscles of both macro- and microcnemes are of similar shape and strength. They are strong and are made up of six to 10 mostly unbranched pleats. The basilar muscles are weak but distinct. The micronemes, throughout most of the column length, consist of little more than parietal muscle. Twelve pairs, or a few more, run the length of the column, lack filaments and are sterile. In the region of the short scapulus there occurs part of an additional cycle of very weak micronemes (16 pairs in the sectioned specimen). This accounts for the species having more tentacles than mesenteries at the pedal disc.

The acontia are sparse and short. In cross section they are circular rather than triangular, about 150 μ in diameter, and the nematocyst tract occupies about one third of the circumference. The specimens sectioned are ripe males.

The actinopharynx is longitudinally corrugated. Its ectoderm contains very numerous, small, dark-staining nuclei and pale-staining mucous cells. There are two prominent siphonoglyphs.

Cnidom: Spirocysts of tentacles 15-18 $\times$ 2·5 μ, numerous. Microbasic b-mastigophores of tentacles 18-20 $\times$ 2-2·5 μ, common; of column, 18 $\times$ 2·5 μ, few; of actinopharynx, 30 $\times$ 3 μ, numerous; of acontia. 28-32 $\times$ 3-4 μ, numerous. Microbasic p-mastigophores of tentacles 17 $\times$ 3 μ, few; of column, 13 $\times$ 3 μ, few; of actinopharynx, 16 $\times$ 4 μ, common; of filaments, 11-14 $\times$ 4 μ, few; of acontia, 32 $\times$ 4 μ, numerous.

Remarks: The specimens here identified as *Isophellia stela* resemble very closely *I. sabulosa* Carlgren (1900: 52, Pl. 1, fig. 9) from Zanzibar. An obvious difference, but one that I think may reflect environment, is the complete investment of the *I. sabulosa* scapus with sand while only the upper half of the scapus in *I. stela* is covered. A discrepancy of more importance is the apparent lack of cinclides in the Port Phillip Bay specimens. Cinclides, however, are frequently difficult to observe in many of the Isophellidae, especially so in preserved specimens. Carlgren (1928) added to the description of *I. sabulosa*. Here his text figures 68 of the sphincter, 71 of the mesentery and 72 of the parietal muscle are virtually identical to depictions of those same structures in *I. stela*. On the other hand, all types of nematocysts from *I. stela* are somewhat larger than those of *I. algoensis* Carlgren (1928). Carlgren separated *algoensis* from *sabulosa* largely on the basis of the larger nematocysts in the former species.

Primarily on the basis of the larger nematocysts in *I. stela* but also with consideration of the more tropical range of *I. sabulosa*, I consider the Port Phillip Bay specimens to represent a new species.

Family SAGARTIIDAE

Anthothoe albocincta (Hutton)

Gregoria albocincta Hutton, 1879: 312.
Sagartia albocincta, Stuckey, 1909b: 372, Pl. 20, fig. 2-3; Stuckey, 1909c: 376, 382; Stuckey and Walton, 1910: 541.
? *Actinothoe albocincta,* Carlgren, 1949: 103.
Anthothoe albocincta, Carlgren, 1950a: 10; Carlgren, 1950b: 142, Pl. 3, fig. 1; Parry, 1951: 89; Parry, 1952: 129; Carlgren, 1954: 584.

Survey areas 10 (103) 7, 25 (129) 7, 29 (107) 5, 43 (303) 3, 59 (80) 9, 59 (24) 1, 59 (25) 2, 61 (37) 44.

REMARKS: The Port Phillip Bay specimens agree well in anatomical features with specimens from New Zealand. However, the nematocysts, especially of the acontia, are somewhat longer in Port Phillip specimens. In New Zealand specimens they are 50-65 × 7 μ microbasic p-mastigophores and 20-25 × 2 μ microbasic b-mastigophores while in those from Port Phillip these nematocysts are 70-90 × 6-7 μ and 30 × 2 μ, respectively. The p-mastigophores appear to have detachable 'darts' on the end of the shaft. This discrepancy in nematocyst sizes is also noted by Carlgren (1950a). I tend to agree with him that the observed differences, in this case, are not especially meaningful.

Family HORMATHIIDAE

Cricophorus nutrix (Stuckey)

Sagartia nutrix Stuckey, 1909c: 376, 382, Fig. 6, Pl. 21, fig. 1-2.
Cricophorus nutrix, Carlgren, 1924: 252, Fig. 44-53; Carlgren, 1949: 96; Carlgren, 1950a: 8; Parry, 1951: 89; Parry, 1952: 125; Carlgren, 1954: 582.

Survey area 59 (36) 1, 69 (Rosebud, intertidal), 8.

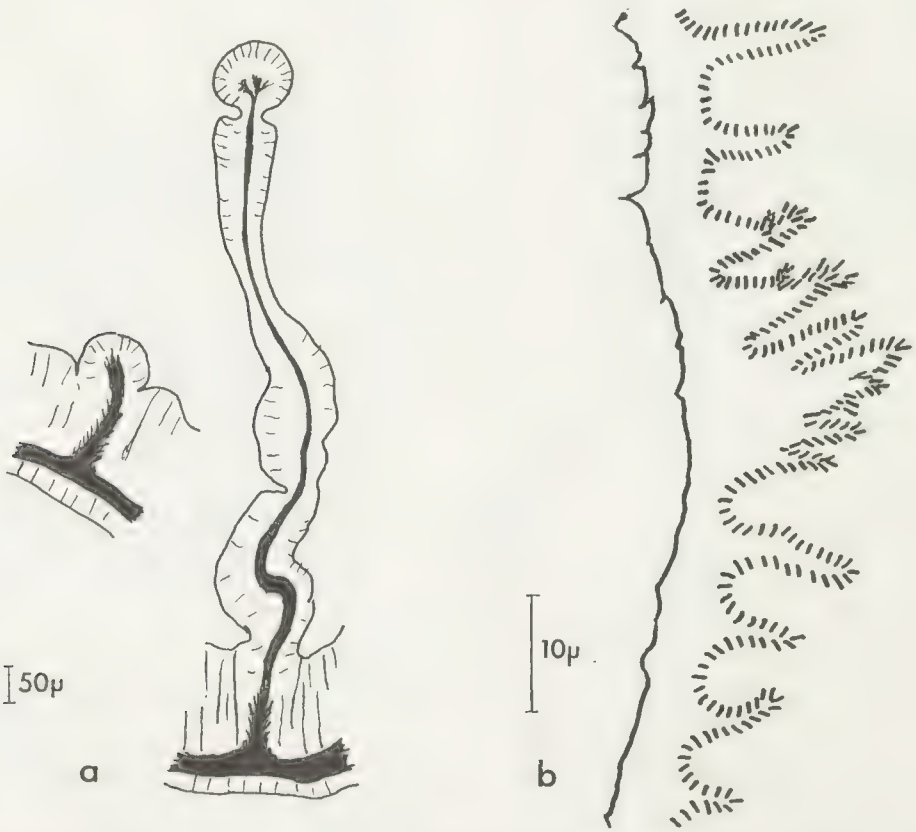


Fig 2—*Parazoanthus lividum* n. sp., *a*, microcneme and macrocneme; *b*, marginal sphincter (only mesogloea shown).

Order ZOANTHIDEA
Family PARAZOANTHIDAE
Parazoanthus lividum n.sp.
Fig. 2, Pl. 9, fig. 4

MATERIAL: Survey area 6 (off Williamstown 29/6/58) 2 specimens.

HOLOTYPE: Nat. Mus. Vict. G1549.

PARATYPE: G1550.

TYPE LOCALITY: Off Williamstown, Vict.

DESCRIPTION: The zoanthids in both lots are on the sponge *Spirasterella* sp. According to Dr Patricia Berquist, the zoanthid is dull bluish-grey and the sponge, yellow ochre. In preservative the zoanthids of one lot are yellow ochre while in the other they are a pale violet-brown. The pieces of sponge are rather well covered by several colonies of zoanthids which consist of two to more than 100 polyps per colony. For the most part the coenenchyme, flattened, band-like and two to 4 polyps wide, meanders in the depressions between nodules on the sponge surface. However, at the distal end of the sponge the coenenchyme is sheet-like and almost completely caps the rounded end of the sponge. In the proximal region of the sponge the colonies are small and separate. The largest opened polyp measures 2 mm in diameter and extends 1 mm above the surface of the coenenchyme. Some of the closed polyps are flush with the surface of the coenenchyme while most appear as hemispheres. The polyps are close together, many with their margins touching. Small polyps are interspersed randomly among large ones. Incrustation consists of fine, uniform-sized grains of quartz and calcareous sand plus a few sponge spicules. It is moderately dense on the polyps, sparse in the middle of the coenenchyme band, and virtually absent along the edges of coenenchyme. The ridges of the scapulus number to 16 and are distinct in semi-open or open polyps. The tentacles number to 29.

Marginal sphincter is entodermal, occupying the entire length of the scapulus (about 120 μ long). It consists of 10 to 12 pleats of which the highest is about 20 μ. The mesogloea in this area is about 6 μ thick.

Mesenteries number to 29 in large specimens with 16 being macrocnemes and 13, microcnemes. The retractor muscles of macrocnemes are very weak and consist of a thin sheath of fibres without underlying mesogloeal pleating. The filaments are of typical shape, are ciliated, contain numerous nematocysts as well as acidophilic gland cells. The parietal portions of the macrocnemes, with respect to the appearance of the mesogloea and muscle fibres, are very similar to microcnemes. Here the mesogloea is thick (25 μ) and the muscle fibres are borne on low mesogloeal pleats. The microcnemes extend out from the column mesogloea a distance equal to or slightly greater than the thickness of the column entoderm (about 125 μ). All specimens sectioned lacked discernible gonads.

The actinopharynx is longitudinally corrugated. The siphonoglyph is shallow but distinct. The hyposulcus is slightly shorter and indistinct.

The mesogloea is acellular and in the column contains incrustation and lacunae with entodermal cells. A distinct encircling sinus was not apparent but some of the cords of entodermal cells could have been part of such a sinus.

The ectoderm of the column is disrupted by the incrustation. Intact portions (about 30 μ thick) contain numerous holotrichs and also acido- and basophilic gland cells.

The entoderm contains zooxanthellae in abundance as well as acido- and basophilic gland cells.

Cnidom: Spirocysts of tentacles, 15-20 $\times$ 3 μ, numerous. Microbasic b-mastigophores of tentacles, 16-17 $\times$ 2-2·5 μ, common; of actinopharynx, 18-21 $\times$ 2·5-3 μ, common. Microbasic p-mastigophores of tentacles, 15 $\times$ 3-4 μ, common; of filament, 15-19 $\times$ 4 μ, common. Holotrichs of filaments, 22-25 $\times$ 10-12 μ, few; of column ectoderm, 20-25 $\times$ 10 μ, numerous.

REMARKS: Only *Parazoanthus capensis* Duerden (1907: 180, Pl. 11) from South Africa seems sufficiently close to *P. lividum* to warrant close comparison. Carlgren (1938: 95, Fig. 48, Pl. 1, fig. 4) has given further details of this species. First, *P. capensis* occurs on a different species of sponge, is pale yellow in-

stead of bluish-grey, and the colonies seem never to have as many polyps as the majority of colonies of *P. lividum*. The polyps of *P. capensi* are twice the size of those of *P. lividum* and have 14 scapular ridges instead of 16. The nematocysts of *P. capensis* are in general 2-4 μ longer than in *P. lividum*. In view of these discrepancies and the geographic separation of the two species, I consider the Port Phillip Bay specimens a new species.

Family EPIZOANTHIDAE

Epizoanthus sabulosum n.sp.

Fig. 3, Pl. 9, fig. 3

Survey area 58 (293) 1 colony.

HOLOTYPE: Nat. Mus. Vict. G1551.

TYPE LOCALITY: Point Lonsdale, Vict.

DESCRIPTION: The single lot of zoanthids from area 58 were on a delicate, branching sponge about 8 cm high. The several colonies on the sponge take the form of tight clusters of up to 6 polyps. Interspersed among these are single polyps. There is a total of about 100 polyps on the sponge. None of the polyps is expanded. The largest of the least contracted polyps is 4 m high and a greatest diameter of 3 mm. The coenenchyme is flattened and scarcely exceeds the circumference of the polyp's base. Both the polyps and coenenchyme are densely incrusted with quartz sand grains. The scapular ridges number to 15, are prominent and are heavily incrusted. Tentacles number to 30 in large polyps.

Marginal sphincter muscle in the mesogloea, alveolar, the 16 to 18 alveoli situated about mid mesogloea. The sphincter is moderately strong, about 200 μ long in section.

The mesenteries number to 30 of which 15 are macrocnemes and 15 are microcnemes. The macrocnemes bear filaments and are fertile. The specimens sectioned are female.

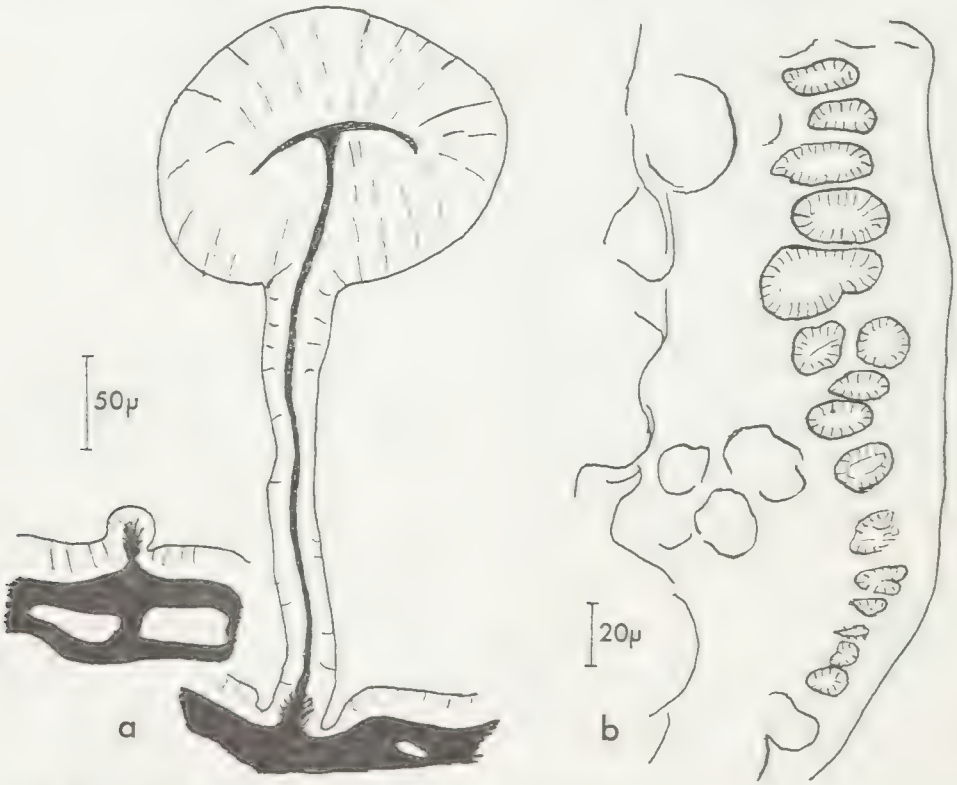


Fig. 3—*Epizoanthus sabulosum* n. sp., *a*, microcneme and macrocneme; *b*, marginal sphincter (only mesogloea shown).

The musculature of the macrocnemes is extremely weak and consists of only a thin layer of fibres against the mesogloeal lamella. The mesogloea in the parietal part of the mesenteries is about three times as thick as the rest of the mesentery lamella and is pleated against the parietal muscle. The microcnemes are similar in shape and size to the thickened parietal portions of the macrocnemes. The filaments on the macrocnemes are of typical shape in sections but are exceptionally thick.

The actinopharynx is longitudinally corrugated. A distinct siphonoglyph and an indistinct hyposulcus are present.

The mesogloea of the column is thick and contains much incrustration as well as isolated nests of ectodermal cells and acido- and basophilic gland cells.

The ectoderm of the column is greatly interrupted because of the dense incrusation but where present is up to 25 μ thick.

The entoderm contains numerous zooxanthellae, a feature unsual for members of this genus.

Cnidom: Spirocysts of tentacles 15-22 $\times$ 2·5-3 μ, numerous. Microbasic b-matigophores of tentacles 16-20 $\times$ 2 μ, few; of actinopharynx, 16 $\times$ 2·5 μ, few. Microbasic p-mastigophores of filaments 16 $\times$ 4 μ, common. Holotrichs of column 15-20 $\times$ 8-10 μ, few.

REMARKS: Of the 17 species of *Epizoanthus* known from the Pacific and Indian Oceans, nine species are free-living, four form carcinoecea, two are symbionts of gastropods, and two are symbionts of *Hyalonema*. Many of these species can be eliminated from consideration solely on the basis of their geographical and/or bathymetrical range or their growth form. I have not exhaustively compared all other species but I cannot find in my collection or in the literature any species of *Epizoanthus* that is similar enough to the Port Phillip species to warrant a detailed comparison The Port Phillip species seems to be unique from the standpoint of the type of sponge on which it is found, its occurrence in shallow water, its size, number of septa, and in its possession of zooxanthellae.

References

ANDRES, A., 1883. Le Attinie. *Mem., Atti della R. Accad. dei Lincei, Rome*, Ser. 2, 14: 211-673.

CARLGREN, O., 1900. Ostrafrikanische Actinien gesammelt von Herrn Dr. F. Stuhlmann 1888 und 1889. *Jahrb. der Hamburg. Wissensch. Anstalten* 17 (2): 1-124.

———, 1924. Actiniaria from New Zealand and its Subantarctic Islands. Papers from Dr. Th. Mortensen's Pacific Expedition, 1914-1916, No. 21. *Vidensk. Medd. fra Dansk Naturh. Foren. Köbenhavn* 77: 179-261.

———, 1928. Actiniaria der Deutschen Tiefsee-Expedition, *Wiss. Ergeb der Deutschen Tiefsee-Exped. auf dem Dampfer "Valdivia" 1898-1899*, 22 (4): 125-266.

———, 1938. Some South African Actiniaria and Zoantharia. *K. Svenska Vet. Akad. Handl.* 17 (3): 1-148.

———, 1945. Further contributions to the knowledge of the cnidom in the Anthozoa especially in the Actiniaria. *Lunds Univ. Arsskrift N. F.* (2), 41 (9): 1-24.

———, 1949. A survey of the Ptychodactiaria, Corallimorpharia and Actiniaria. *K. Svenska Vet. Akad. Handl.*, Ser. 4, 1 (1): 1-121.

———, 1950a. Actiniaria and Zoantharia from South Australia. *K. Fysiogr. Sällsk. i Lund Förhandl.* 20 (10): 1-15.

———, 1950b. Corallimorpharia, Actiniaria and Zoantharia from New South Wales and South Queensland. *Arkiv. f. Zool.* 1 (10): 131-146.

———, 1954. Actiniaria and Zoantharia from South and West Australia with comments upon some Actiniaria from New Zealand. *Arkiv f. Zool.*, ser. 2, 6 (34): 571-595.

COUGHTREY, M., 1875. Description of a new species of Actinia. *Trans. N.Z. Inst.* 7: 280.

DANA, J. D., 1846 (text), 1849 (atlas). *Zoophytes. U.S. Exploring Expedition (during the years 1838-1842) under the command of Charles Wilkes, U.S.N.* 7: 1-740. Philadephia.

———, 1859. *Synopsis of the report on zoophytes of the U.S. Exploring Expedition around the world under C. Wilkes, U.S.N. Commander, in the years 1838-1842.* New Haven. vi. + 172 pp.

DUERDEN, J. E., 1895. On the genus *Allcia* (*Cladactis*), with an anatomical description of *A. costae* Pane. *Ann. Mag. nat. Hist.*, Ser. 6, 15 (87): 213-218.

———, 1907. A new species of *Parazoanthus*. *Rec. Albany Mus.* 2: 180.

FARQUHAR, H., 1898. Preliminary account of some New Zealand Actiniaria. *J. Linn. Soc. (Zool.)* 26: 527-536.

HADDON, A. C., and J. E. DUERDEN, 1896. On some Actiniaria from Australia and other districts. *Trans. Roy. Dublin Soc.*, N.S., 6 (pt. 6): 139-172.

HUTTON, F. W., 1879. The sea anemones of New Zealand. *Trans. N.Z. Inst.* 11: 308-314.

LAGER, E., 1911. Actiniaria. *In* Michaelsen, W. and R. Hartmeyer: *Die Fauna Südwest-Australiens. Ergebnisse der Hamburger südwest-australischen Forschungsreise 1905*, 3 (pt. 8): 215-249. Jena.

MILNE EDWARDS, H., 1857. *Histoire naturelle des Coralliaires*, vol. 1. Librairie Encyclopédique de Rorer, Paris, viii + 326 pp.

MILNE EDWARDS, H., and J. HAIME, 1851. *Monographie des Polypiers Fossiles des Terrains Palaeozoiques précédée d'un Tableau Général de la Classification des Polpes,* vol. 5. Paris.

PARRY, G., 1951. The Actiniaria of New Zealand, pt. 1. *Rec. Cant. Mus.* 6 (1): 83-119.

————, 1952. The Actiniaria of New Zealand, pt. 2. *Rec. Cant. Mus.* 6 (2): 121-141.

QUOY, J. R. C., and J. P. GAIMARD, 1833. *Zoologie. Voyage de decouvertes de l'Astrolabe pendant les années 1826-1829 sous le commandement de M. J. Dumont d'Urville.* Paris. Vol. 4, 390 pp., with folio atlas of 26 pl, 414 figs.

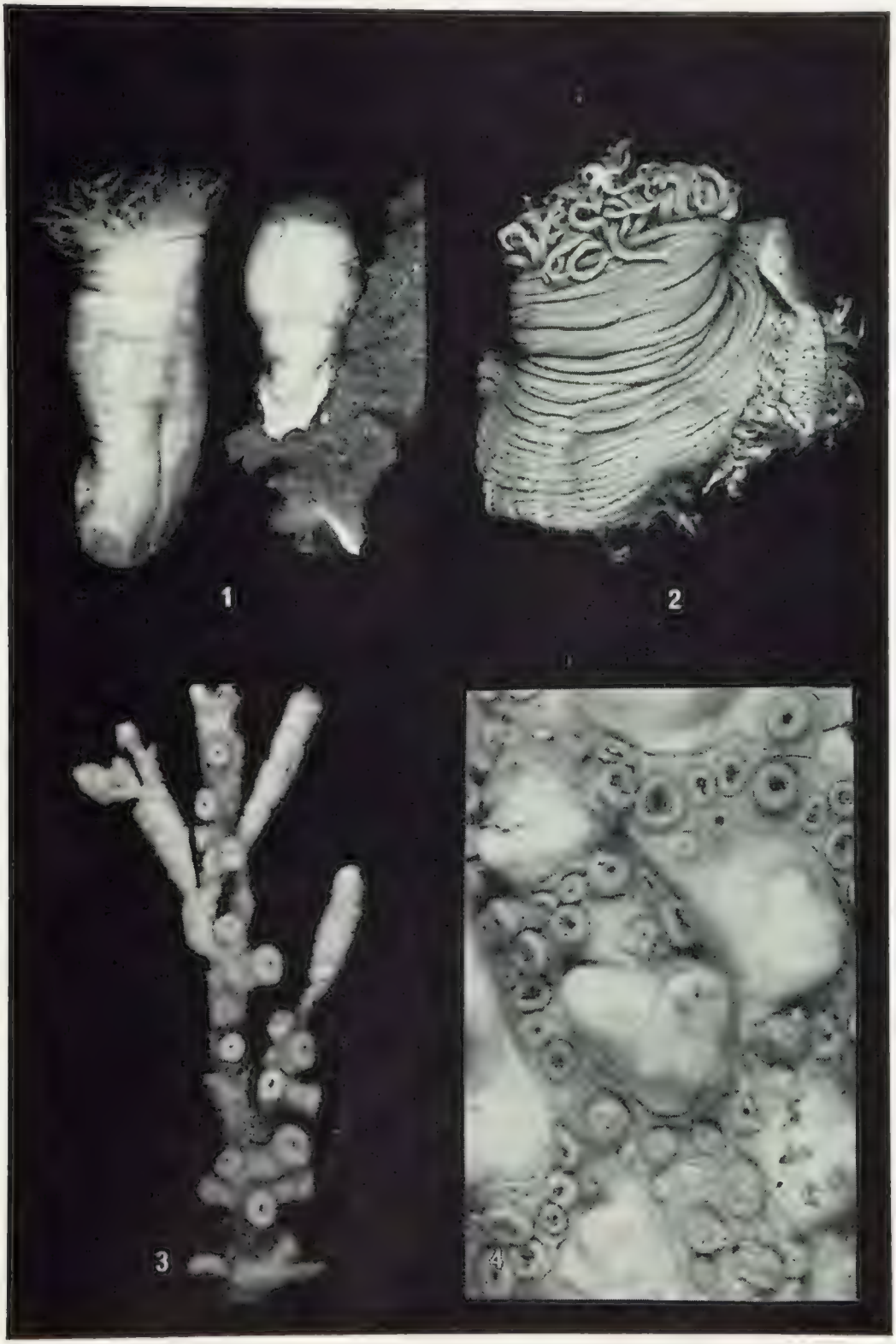
STEPHENSON, T. A., 1922. On the classification of Actiniaria, 3. *Quart. J. Micr. Sci.* 66: 247-319.

STUCKEY, F. G. A., 1909a. Notes on a New Zealand actinian, *Bunodes aureoradiata. Trans. N.Z. Inst.* 1908 (new issue) 41: 367-369.

————, 1909b. On two anemones found in the neighbourhood of Wellington—*Leiotealia thompsoni* and *Sagartia alboncincta. Trans. N.Z. Inst.* 1908 (new issue) 41: 370-374.

————, 1909c. A review of the New Zealand Actiniaria known to science, together with a description of twelve new species. *Trans N.Z. Inst.* 1908 (new issue) 41: 374-398.

STUCKEY, F. G. A., and C. L. WALTON, 1910. Notes on a collection of sea anemones. *Trans. N.Z. Inst.* 1909 (new issue) 42: 541-542.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INTERTIDAL ECOLOGY OF PORT PHILLIP BAY WITH SYSTEMATIC LIST OF PLANTS AND ANIMALS

By R. J. King,* J. Hope Black† and Sophie C. Ducker*

Abstract

The zonation is recorded at 14 stations within Port Phillip Bay. Any special features of a station are discussed in relation to the adjacent stations and the whole Bay. The intertidal plants and animals are listed systematically with references, distribution within the Bay and relevant comment.

1. INTERTIDAL ECOLOGY

By R. J. King and J. Hope Black

Introduction

This account is basically concerned with the distribution of intertidal plants and animals of Port Phillip Bay. The benthic flora and fauna have been dealt with in separate papers (Memoir 27 and present volume).

Following preliminary investigations, 14 stations were selected for detailed study in such a way that all regions and all major geological formations were represented. These localities are listed below and are shown in Figure 1.

For ease of comparison with Womersley (1966), in his paper on the subtidal algae, the bay is divided into the same regions. All regions except Central Bay are included.

The dates given are the dates of the main investigation of the area, but all stations have been visited on several occasions.

Northern Bay—Areas 1-14

Area 6: Station 16 Williamstown, 28 Aug. 69

Corio Bay—Areas 15-18, 25-30, 37-40

Area 16: Station 23 Kirk Pt. 2 Feb. 69

Area 25: Station 19 North Corio Bay, 17 Sept. 69

Area 26: Station 2 Limeburners Ck. 17 Sept. 69

Area 27: Station 17 Pt Wilson, 2 Feb. 70

Area 29: Station 22 Portarlington, 16 Oct. 69

South-western Bay—Areas 42, 49, 50

Area 42: Station 21 St. Leonards 16 Oct. 69

Area 49: Station 4 Swan Bay Jetty, 17 Sept. 69

Eastern Bay—Areas 23-24, 35-36, 47-48, 55

Area 23, Station 20, Ricketts Pt., 30 Sept. 69

Area 55: Station 15 Schnapper Pt. 25 May 70

Area 55: Station 13 Fossil Beach 25 May 70

Southern Bay—Areas 60-64, 67-70

Area 63: Station 24 Martha Pt. 25 May 70

Port Phillip Heads—Areas 58-59

Area 58: Station 10 Queenscliff, 12 Mar. 69

Area 58: Station 5 Pt. Nepean, 15 Jan. 70

Stations or groups of stations are considered separately below. The basic zonation is outlined in a table which, unless otherwise stated, is that of open rock platform. The letters U, M or L after a species refer to its position within the zone indicated. The position shown for a particular species is the level of maximum development and individuals of this species may be found well above and/or below this. Seasonal functuations in abundance occur for many algae and in some cases this has been noted.

Northern Bay

Area 6 (S16) Williamstown (Foreshore off Gloucester Reserve) 28 August 69

Area 6 (S16A) Williamstown (0·25 mi E. of 16).

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FIG. 1—Map of localities.

Geology and Geomorphology

The whole of the foreshore has been altered by man and there is a sea wall along the back of the beach. Basalt boulders have been built up along the sea front and an artificial breakwater, also of basalt, has been built normal to the sea wall approximately half way along the reserve frontage. At station 16A there is a natural rock platform developed on Pleistocene basalt.

Flora and Fauna

The basic pattern of zonation is shown in Table 1. The following species were not recorded even though a special search was made for them: *Austrocochlea constricta, Bembicium* and *Melarapha praetermissa.* The animals are mostly on steep rock faces e.g. *Galeolaria caespitosa* and *Mytilus planulatus*, or in crevices e.g. *Heliocidaris erythrogramma, Actinea tenebrosa, Pateriella calcar*, the orange sponge *Tethys australis,* and numerous small anemones. The algae are commonly on horizontal rock surfaces. Pools at station 16A contained the following algae: *Enteromorpha, Ulva lactuca, Corallina officinalis, Grateloupia filicina* and *Lithothamnion.* The brown algae *Caulocystis cephalornithos, Cystophora polycystidea,*

TABLE 1. NORTHERN BAY REGION, Williamstown (S 16, 16A)

ZONE	PLANTS	ANIMALS
LITTORAL FRINGE	*Salicornia quinqueflora*[2]	*Melarapha unifasciata* L (in crevices and small holes)
	Bangia fuscopurpurea[1] L	
UPPER EULITTORAL	*Enteromorpha* M	*Siphonaria diemenensis* M *Cellana tramoserica* M *Austrocochlea adelaidae*[3] *A. odontis*[3] *Patelloida alticostata*
MID-EULITTORAL	*Porphyra*[1] U *Enteromorpha intestinalis* U *Ulva lactuca*[1] U *Gelidium pusillum* L	*Poneroplax costata* *Mytilus planulatus* L
LOWER EULITTORAL	*Hormosira banksii*[2] U *Centroceras clavulatum* U *Polysiphonia*[1] *Ulva lactuca* M *Caulerpa brownii* L	*Galeolaria caespitosa* U *Actinia tenebrosa* U *Pateriella calcar*[3]
UPPER SUB-LITTORAL	*C. geminata* *C. longifolia* f. *crispata* *C. remotifolia* *C. simpliciuscula* *Corallina officinalis* *Ecklonia radiata* *Lithothamnion* *Sargassum* spp.	U = Upper } part M = Middle } of L = Lower } zone [1] = Seasonally abundant [2] = On natural platform only (S.16A) [3] = In pools

C. retorta, Colpomenia sinuosa, Sargassum sp. and *Scytosiphon lomentaria,* were less abundant, and heavily covered with epiphytic colonial diatoms. *Zostera muelleri* occurs in shallow sandy pools and was also heavily epiphytized.

Corio Bay (A)

Area 16 (S23) Kirk Point 2 February, 1970
Area 27 (S17) Point Wilson 2 February, 1970.

Geology and Geomorphology

These two stations are representative of a number of isolated and small outcrops of Pleistocene basalt on the W. margin of the Bay. The outcrops form boulder beaches limited by sandy beach in the upper regions, and by sandy-clay sediments just below low tide level.

Flora and Fauna

The outcrops are backed by a sandy beach with a high percentage of shell remains. This is fringed on the landward side by *Atriplex cinerea* and behind this is a marsh area with *Salicornia quinqueflora* and *Arthrocnemum halocnemoides* as the most common species. Table 2 shows the basic zonation at these stations. The pattern is substantially modified by conditions of local shelter. The strong development of the algae *Centroceras clavulatum, Grateloupia filicina* var. *luxurians, Rhabdonia robusta, Rhodoglossum* and the excessive growth of *Ulva lactuca* probably indicates nutrient enrichment from the adjacent Melbourne and Metropolitan Board of Works sewerage farm. The same algal representatives occur together near a waste outfall pipe at Portarlington, Area 29 (S22).

Only those animals capable of withstanding the sheltered conditions and the sandy-clay substrate are present. On the rocky outcrops *Bembicum auratum* occurs in the upper eulittoral, grading into *Austrocochlea constricta* above the *Mytilus planulatus-Galeolaria caespitosa* band. On the *Galeolaria* and below it *Cominella*

TABLE 2. CORIO BAY REGION (A) Point Wilson and Kirk Point (S17, 23)

ZONE	PLANTS	ANIMALS
LITTORAL FRINGE		
UPPER EULITTORAL		*Bembicium auratum* U *Austrocochlea constricta* M
MID-EULITTORAL	*Ulva lactuca* U *Enteromorpha* U *Gelidium pusillum* L	*Mytilus planulatus* L
LOWER EULITTORAL	*Polysiphonia*[1] *Centroceras clavulatum* *Grateloupia filicina*[1] M *Caulerpa brownii* L	*Galeolaria caespitosa* U *Cominella eburnea* L *Cominella lineolata* L *Pyura praeputialis* L
UPPER SUB-LITTORAL	*Caulerpa remotifolia* U *C. longifolia* f. *crispata* U *Rhodoglossum* U	U = Upper } part M = Middle } of L = Lower } zone [1] = Seasonally abundant

eburnea and *C. lineolata* are common, while below this at low tide level scattered *Pyura praeputialis* are found. On sandy patches between the rocks the large speckled anemone *Oulactis muscosa* is common, as are the molluscs *Katelysia rhytophora* and *Parcanassa pauperata. Anadara trapezia* which was taken in numbers in Corio Bay region by the benthic survey is found to extend into the upper sublittoral and lower eulittoral zones on the sandy beaches to the north of Point Wilson and Kirk Point. They occur in large clumps of dead and living shells many clumps having up to a dozen live shells in them.

To the SE. of Point Wilson there are large beds of *Zostera*, with *Ulva lactuca* and *Caulerpa* species occurring on isolated rocks. On the sheltered inner margin of these beds *Acetabularia peniculus* is found growing on dead *Katelysia scalarina* shells.

Corio Bay (B)

Area 25 (S19) Corio Bay North 17 September, 1969.

Geology and Geomorphology

The shoreline is in Tertiary limestone, marls and sands. These have eroded to form low cliffs approximately 20 ft. high with a narrow boulder beach derived from the bedrock. The cliff breaks away in large blocks up to six ft. across, which are broken down and sorted by the sea.

Flora and Fauna

The numerous boulders afford protection for the intertidal animals and although the environment has a limited fauna in species, the number of individuals is large. The general distribution of species is shown in Table 3. There are no *Melarapha* although large boulders at the base of the cliff should provide a suitable habitat. Under stones in the mid- and lower eulittoral are *Cominella lineolata* and *Paragrapsus gaimardii;* also occasionally *Lepsiella vinosa, Velacumantus australis, Pateriella brevispina,* and *Tosia australis* are found. *Anadara trapezia* is present in small numbers. Algae growing in the lower eulittorial and upper sublittoral zones are covered with epiphytic diatoms.

Corio Bay (C)

Area 29 (S22) Portarlington 16 October, 1969.

Geology and Geomorphology

The bedrock is lower Tertiary basalt and there is a small, almost horizontal, wave cut platform (Jutson 1931). The platform lies in the mid- and lower-eulittoral, and there is a sharp drop into the sub-littoral.

Flora and Fauna

The general pattern of zonation is shown in Table 4. In sandy patches in the upper sublittoral *Zostera muelleri* occurs heavily epiphytized by *Ulva lactuca* and *Punctaria latifolia* with some *Acrosorium uncinatum.* Near the

drain outlet at the W. end of the reef *Centroceras clavulatum, Grateloupia filicina* var. *luxurians, Rhabdonia robusta* and *Rhodoglossum* occur with the increased growth of *Ulva lactuca* c.f. Kirk Point and Point Wilson. Many of the larger brown algae in the upper sublittoral zone are covered by Ectocarpaceae and colonial diatoms.

TABLE 3. CORIO BAY REGION (B), Corio Bay North (S19)

ZONE	PLANTS	ANIMALS
UPPER EULITTORAL	*Enteromorpha* L	
MID-EULITTORAL	*Ulva lactuca* M *Enteromorpha M* *Porphyra* *Caloglossa leprieurii* M *Gelidium pusillum* M	*Bembicium auratum* U *Austrocochlea constricta* M *Notoacmea septiformis* L *Chthamalus antennatus* L *Mytilus planulatus* L
LOWER EULITTORAL	*Chaetomorpha darwinii* U *Codium fragile* M *Petalonia fascia* M *Scytosiphon lomentaria* M	*Galeolaria caespitosa* U
UPPER SUB-LITTORAL	*Caulerpa remotifolia* *C. simpliciuscula* *Sargassum* *Zostera muelleri*[1]	*Andara trapezia*[1] L U = Upper ⎫ part M = Middle ⎬ of L = Lower ⎭ zone [1] = Sandy patches between boulders.

TABLE 4. CORIO BAY REGION (C), Portarlington (S22)

ZONE	PLANTS	ANIMALS
SUPRA-LITTORAL	*Bangia fuscopurpurea*[1] L	
UPPER EULITTORAL	*Enteromorpha* M	*Bembicium melanostomum* U *B. nanum* (rare) *Austrocochlea constricta* M
MID-EULITTORAL	*Porphyra*[1] M *Enteromorpha intestinalis* M	*Chthamalus antennatus* U (on pipeline base) *Siphonaria diemenensis* M *Patelloida alticostata* M *Notoacmea septiformis* M *Mytilus planulatus* L
LOWER EULITTORAL	*Hormosira banksii* U *Centroceras clavulatum* M *Ulva lactuca* M *Chaetomorpha aerea*[2] M *Corallina officinalis* M	*Galeolaria caespitosa* U *Montfortula rugosa* U *Lepsiella vinosa* U
UPPER SUB-LITTORAL	*Grateloupia filicina*[2] U *Rhodoglossum*[2] U *Caulerpa remotifolia* M *C. simpliciuscula* M *Caulocystis cephalornithos* M *Cystophora polycystidea* *Ecklonia radiata* *Sargassum* spp.	U = Upper ⎫ part M = Middle ⎬ of L = Lower ⎭ zone [1] = Seasonally abundant [2] = Abundant near pipe outlet

South-Western Bay

Area 42 (S21) St. Leonards 16 October, 1969.

Geology and Geomorphology

The bedrock is Pliocene ferruginous sandstone, which forms a narrow platform just above low tide mark.

Flora and Fauna

The platform lies offshore, and behind this are beds of *Zostera muelleri*, and then a band of shingle between the *Zostera* and the sandy beach. At about mid-tide level the shingles are covered with *Enteromorpha intestinalis*, and at lower levels with *Laurencia, Ceramium* and *Polysiphonia.* Occasionally *Caulocystis uvifera* occurs on large rocks. *Acetabularia peniculus* is recorded on dead shells of *Katelysia scalarina.* The *Zostera* beds are dense, and appeared to be accumulating sediments, being some 6-12 in higher than surrounding bare areas. The *Zostera* is covered with epiphytes: *Enteromorpha, Ulva lactuca, Champia affinis*, and less commonly with *Acrosorium uncinatum* and *Polysiphonia.*

The fauna of the *Zostera* beds includes *Actinia australis, Cnidopus veratra, Philyra laevis, Katelysia scalarina, Austrocochlea constricta* (small) *Cominella lineolata* and *Parcanassa pauperata.*

The platform lies in the lower eulittoral and below, and the distribution of species is summarized in Table 5. Along the W. coastline the change from open coast species to the more typical bay species is quite abrupt, Figure 2, and this corresponds with a marked change in substrate and degree of wave action.

Eastern Bay (A)

Area 23 (S20). Ricketts Point. 30 September 1969.

Geology and Geomorphology

Ricketts Point consists of lateritized Tertiary marine sediments, the ironstone point forming an intertidal platform. On the higher parts, coarse gravel to sand are present.

Flora and Fauna

The basic zonation pattern is shown in Table 6. It should be noted that:

1. The littoral fringe is almost bare. There are no rock stacks, and no *Melarapha.*
2. The demarcation between the lower eulittoral and the upper sublittoral is not particularly clear.

TABLE 5. SOUTH-WESTERN BAY REGION, St. Leonards (S21)

ZONE	PLANTS	ANIMALS
LITTORAL FRINGE		
UPPER EULITTORAL		*Austrocochlea constricta* L (on inshore pebbles)
MID-EULITTORAL	*Enteromorpha intestinalis* L	
LOWER EULITTORAL	*Hormosira banksii* U *Ulva lactuca* U *Laurencia* M *Caulerpa brownii* L	*Austrocochlea odontis* *Cominella lineolata*
UPPER SUB-LITTORAL	*Caulerpa remotifolia* U *Cystophora retorta* U *C. subfarcinata* *Caulocystis cephalornithos*[1] *C. uvifera* *Sargassum decipiens*	*Halicarcinus rostratus* U = Upper } part M = Middle } of L = Lower } zone [1] = Local Shelter [2] = Amongst algae

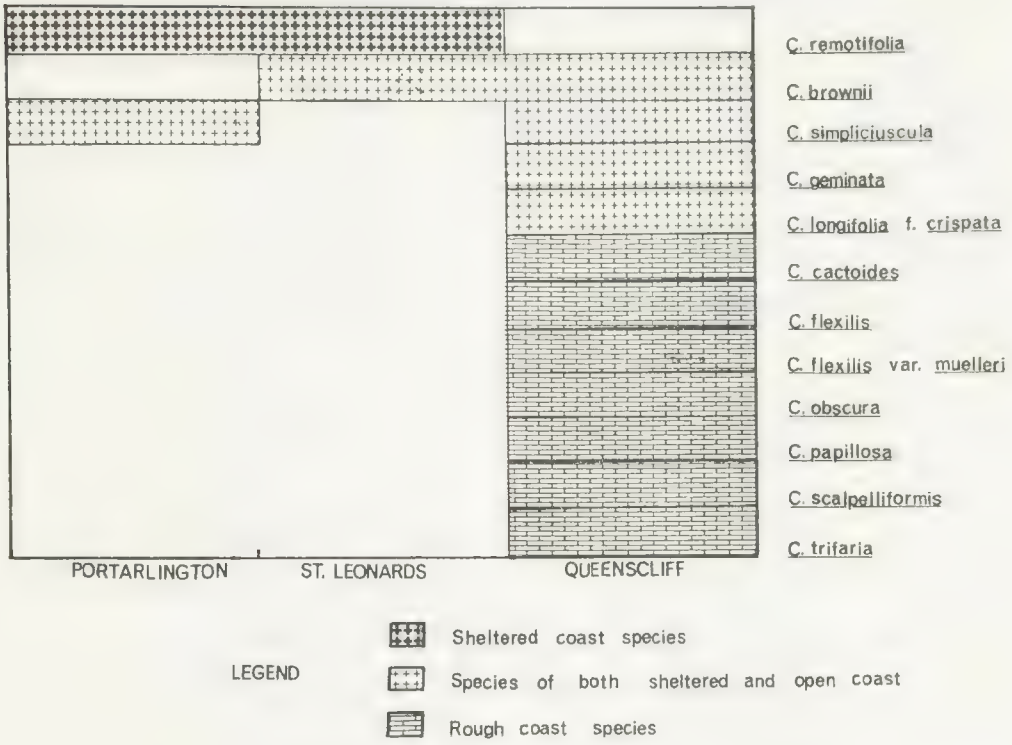

FIG. 2—Distribution of *Caulerpa* spp. on the W. coast of Port Phillip.

3. Where *Ibla* occurs, it forms colonies adjacent to *Galeolaria*; it does not shelter amongst the worm tubes as on open coast.
4. In the upper sublittoral the Fucales *Caulocystis cephalornithos, Cystophora moniliformis, C. retorta, C. subfarcinata* and *Sargassum* occur only as isolated plants, never in a dense band. They are frequently covered with Ectocarpaceae and colonial diatoms.

In shallow pools in the mid-eulittoral *Ulva lactuca, Corallina officinalis, Lithothamnion* and *Austrocochlea constricta* are common. In pools at lower levels *Corallina officinalis* and *Lithothamnion* are dominant with *Chaetomorpha aerea, Ectocarpaceae, Polysiphonia,* colonial diatoms, the molluscs *Notoacmea petterdi, Montfortula rugosa* and the crab *Paragrapsus gaimardii*. Pools towards the outer edge contain *Ischnoradsia evanida*. In pools in the lower eulittoral *Austrocochlea odontis, Cominella lineolata, Subninella undulata, Poneroplax costata* and *Pateriella calcar* are common. *Cnidopus veratra* occurs at all levels.

In sandy patches between the tongues of the platform *Zostera muelleri* occurs with epiphytic *Cladophora* and *Punctaria latifolia* or *Ulva lactuca* and *Porphyra* at slightly higher levels. The associated animals in these areas are the anenome *Cnidopus veratra*, and molluscs *Austrocochlea odontis* with a few *Austrocochlea constricta* and *Parcanassa pauperata*. No bivalves are recorded.

In sandy pools on the inner part of the platform there are scattered plants of *Ulva lactuca*, the molluscs *Zeacumantus diemenensis, Parcanassa pauperata* and a few *Austrocochlea constricta*.

The beach N. of Ricketts Point is of very fine sand in which the dominant species is *Donacilla angusta*. There are scattered holes probably of soldier crabs, *Mictyris platycheles*. A freshwater drain on the E. edge has a dense population of *Salinator fragilis*.

TABLE 6. EASTERN BAY REGION (A), Ricketts Point (S20)

ZONE	PLANTS	ANIMALS
LITTORAL FRINGE	*Salicornia quinqueflora* U (occasional in small patches of ironstone gravel and sand)	
UPPER EULITTORAL	*Enteromorpha*[1] M	*Bembicium auratum* U (very abundant) *Cominella lineolata* L *Austrocochlea constricta* L
MID-EULITTORAL	*Porphyra*[1] M *Ulva lactuca*[1] M *Gelidium pusillum* L	*Cellana tramoserica* M *Patelloida alticostata* M *Mytilus planulatus*[3, 4] L
LOWER EULITTORAL	*Hormosira banksii* U *Laurencia*[4] L *Corallina officinalis*[2] L *Caulerpa brownii*[4] L	*Galeolaria caespitosa* U *Ibla quadrivalvis*[2] U *Lepsiella vinosa* U *Subninella undulata* L
UPPER SUB-LITTORAL	*Codium fragile*[3] U *Ulva lactuca*[2, 3] *Caulocystis cephalornithos*[3, 4] *Cystophora moniliformis*[3, 4] *C. retorta*[4] *C. subfarcinata*[4] *Dictyota dichotoma*[2] *Sargassum*[3, 4] *Scytosiphon lomentaria*[1, 2] *Polysiphonia*[3] *Porphyra*[1, 3]	*Patierella brevispina*[2] *Coscinasterias calamaria*[2] U = Upper } part M = Middle } of L = Lower } zone [1] = Seasonally abundant [2] = West side the platform [3] = South of platform [4] = East of platform

Eastern Bay (B)

Area 55 (S15) Mornington (Schnapper Point) 25 May, 1970.

Area 55 (S13) Mornington (Fossil Beach) 25 May, 1970.

Geology and Geomorphology

Schnapper Point is a resistant headland of Pliocene laterite. Below the cliff there is only slight platform development, and most of the intertidal area is composed of isolated boulders. At Fossil Beach, which is approximately two miles S. of Schnapper Point, laterite is underlain by Miocene marine siltstone which forms the intertidal zone.

Flora and Fauna

The basic zonation is shown in Table 7. *Hormosira banksii*, which is characteristic of the lower eulittoral zone throughout the bay, is not recorded. This appears to be due to lack of suitable substrate. The general discussion of this area is included with that of Martha Point Area 63 (S24).

Southern Bay

Area 63 (S24) Martha Point 25 May 1970.

Geology and Geomorphology

The bedrock is upper Palaeozoic granodiorite with well-developed intertidal platforms (Jutson 1940).

Flora and Fauna

The zonation is summarized in Table 8. It is basically similar to that at the Mornington Stations (Eastern bay (B)) but the following important differences occur:

1. The presence of *Lichina confinis* in the spray zone and in the upper eulittoral. This is indicative of an increase in the amount of wave action.
2. *Rivularia firma* was found in the mid-eulittoral. This species is otherwise recorded only for the two stations at the Heads.
3. *Hormosira banksii* in the uppermost part of the lower eulittoral.

TABLE 7. EASTERN BAY REGION (B), Mornington, Schnapper Point and Fossil Beach (S15, 13)

ZONE	PLANTS	ANIMALS
LITTORAL FRINGE		*Melarapha unifasciata* *Melarapha praetermissa*
UPPER EULITTORAL		*Bembicium auratum*[1] U *Bembicium nanum* U *Austrocochlea concamerata*[1] U *Patelloida latistrigata*[1] M *Chamaesipho columna* L
MID-EULITTORAL	*Ulva lactuca* M	*Austrocochlea constricta* M *Cellana tramoserica* M *Siphonaria diemenensis* M *Actinia tenebrosa* *Galeolaria caespitosa L*
LOWER EULITTORAL	*Ulva lactuca* U *Corallina officinalis* M *Lithothamnion* *Laurencia*[2] *Caulerpa brownii* L *C. flexilis*[3] L	*Mytilus planulatus U* *Patelloida alticostata* U *Poneroplax costata* M *Subninella undulata* L
UPPER SUB-LITTORAL	*C. geminata* *C. scalpelliformis*[3] *C. remotifolia*[2] *C. simpliciuscula* *Amphiroa beauvoisii* *Ecklonia radiata* *Caulocystis uvifera* *Cystophora moniliformis*[3] *C. retorta*[3] *C. subfarcinata*[3] *C. torulosa*[3]	*Notohaliotis ruber* U U = Upper } part M = Middle } of L = Lower } zone [1] = Local shelter [2] = Schnapper Point only [3] = Fossil Beach only

4. *Ecklonia radiata* occurs only with local shelter (as at the Heads region) and not generally in the upper sublittoral as it does throughout the more sheltered parts of the bay.
5. *Bembicium nanum* has completely replaced the bay species *B. auratum*. At Schnapper Point both species are present but *B. nanum* only occurs at the outer edge of the S. end of the platform.
6. *Mytilus planulatus* only occurs in sheltered positions.
7. *Ibla quadrivalvis* is abundant in crevices, and in the shelter of *Galeolaria* as on open coast.

If we consider all the stations on the E. coastline of the Bay, then Fossil Beach and Martha Point can be regarded as transitional between the rough open coast at the Heads and the more typical inner bay region. The following species are not listed for the bay proper but are found at the transition stations and the Heads; the lichen *Lichina confinis*, the algae *Rivularia firma, Caulerpa flexilis, C. scalpelliformis* and *Cystophora torulosa*, and the mollusc *Bembicium nanum*.

Figure 3 indicates the occurrence of *Caulerpa* species on the E. coastline. *Caulerpa remotifolia* is the only *Caulerpa* that can be regarded as a truly calm water species, and this is completely replaced ecologically by *Caulerpa scalpelliformis* at Fossil Beach. By comparison the change on the W. coast is abrupt (Fig. 2).

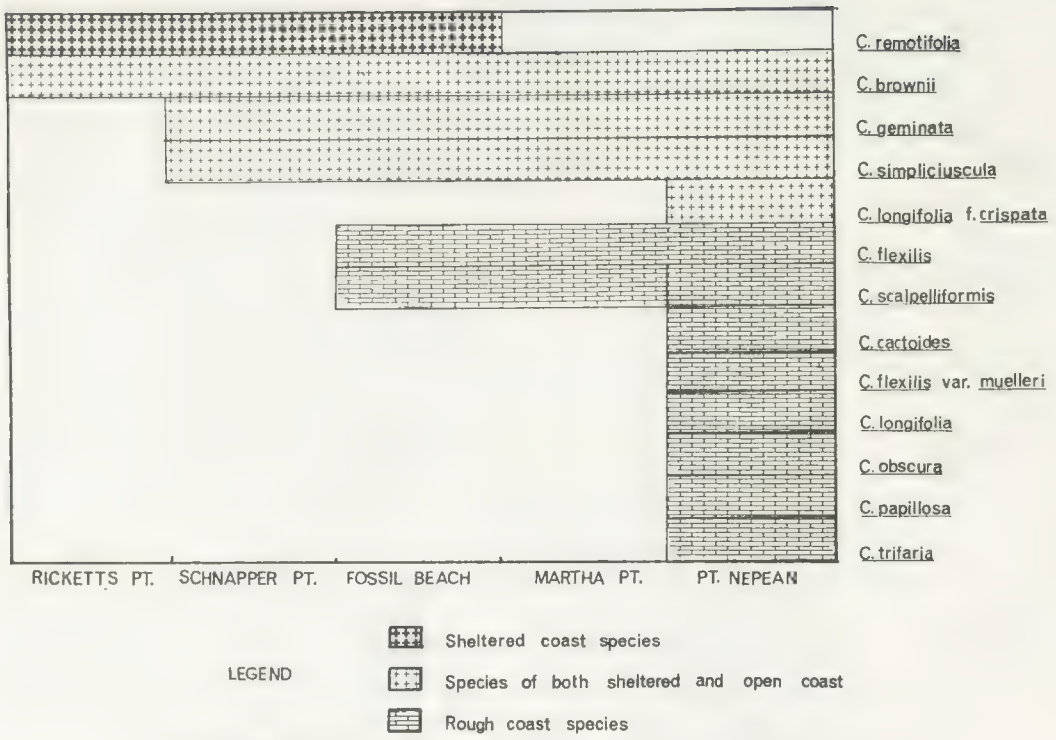

FIG. 3—Distribution of *Caulerpa* spp. on the E. coast of Port Phillip.

TABLE 8. SOUTHERN BAY REGION, Martha Point (S24)

ZONE	PLANTS	ANIMALS
LITTORAL FRINGE	*Lichina confinis*	*Melarapha unifasciata* *Melarapha praetermissa* *Melarapha paludinella*
UPPER EULITTORAL	*Chaetomorpha aerea* (Shallow pools) *Gracilaria verrucosa* (Shallow pools)	*Bembicium nanum* U *Melanerita melanotragus*[1] U *Austrocochlea concamerata*[1] U *Austrocochlea constricta* L
MID-EULITTORAL	*Enteromorpha* *Ulva lactuca* M *Rivularia firma* M	*Chamaesipho columna* M *Cellana tramoserica* U *Siphonaria diemenensis* *Ibla quadrivalvis*[1] *Mytilus planulatus*[1] *Galeolaria caespitosa*
LOWER EULITTORAL	*Hormosira banksii* U *Caulerpa brownii* L	*Patelloida alticostata* U *Poneroplax costata* M *Subninella undulata* L
UPPER SUB-LITTORAL	*C. geminata* *C. scalpelliformis* *C. simpliciuscula* *Ecklonia radiata*[1] *Cystophora moniliformis* *C. retorta* *C. subfarcinata* *C. torulosa*	*Notohaliotis ruber* U U = Upper } part M = Middle } of L = Lower } zone [1] = Local shelter

Port Phillip Heads

Area 58 (S5). Pt. Nepean. 15 January 1970.
Area 58 (S10). Queenscliff. 12 March 1969.

Geology and Geomorphology

The country rock is Pleistocene calcareous aeolianite which forms low cliffs and is eroded into broad shore platforms broken by channels (Bowler 1966). Bird (1964) believes that the platforms have been shaped partly by wave abrasion and partly by solution. At Pt. Nepean the platforms extend over 400 ft seawards with a fall of less than two feet, and then drop off abruptly. The upper zones are represented on only a few isolated outcrops since the platform is for the most part covered by sand on the inner margin.

Flora and Fauna

Wave action at the Heads is at a maximum for Port Phillip and appears to be equivalent to 'moderate exposure' of Bennett and Pope (1960).

The flora and fauna on the surface of the platform is fairly typical of much of the central Victorian coast. The pattern for Pt. Nepean is shown in Table 9. A similar pattern occurs at Queenscliff, but with a reduction in the intensity of wind and wave action the sub-littoral fringe virtually disappears. A variety of habitats is provided in the pools and channels, and beneath overhanging rock ledges. This development is marked on the aeolianite, but is not found elsewhere in the bay. Of the 68 species of algae recorded for the Heads region, and not recorded at any other localities, 38 (56%) are restricted to rock pools. Some species, e.g. *Ecklonia radiata*, common in the upper sublittoral within the bay occur only in pools or with extreme local shelter at the Heads.

Many of the species present are characteristic of rough coasts, e.g. *Apjohnia laetevirens, Dictyosphaeria sericea, Caulerpa cactoides, C. cliftoni, C. flexilis, C. obscura, C. scalpelliformis, Codium galeatum, C. pomoides, Cystophora siliquosa, Durvillea potatorum, Macrocystis angustifolia, Padina fraseri, Petrospongium rugosum, Phyllospora comosa, Splachnidium rugosum, Xiphophora chondrophylla. Ballia callitricha, B. scoparia, Gelidium australe, G. glandulaefolium, Laurencia elata, Pterocladia capillacea. Amphibolis antarctica* is found in pools where sand covers a rocky substrate. *Zostera* is restricted to sheltered sandy pools. *Cladophora rugulosa* is common at Pt. Nepean in shallow mid-eulittoral pools. *Lenormandia prolifera* is characteristic of sandy pools and channels in the lower eulittoral and below.

Like the algae, the fauna of the heads region is more typical of the open coast than the remainder of the bay. *Austrocochlea concamerata* and *Melanerita melanotragus* colonize sheltered areas of the upper eulittoral such as crevices and overhangs. Below this there are *Modiolus pulex* and *Brachidontes rostratus* in patches but they do not form the extensive sheets of many open coasts. *Pyura praeputialis* occurs in the lower eulittoral but in crevices reaches higher levels.

Extreme Shelter

Area 26 (S2). Limeburners Bay. 17 September 1969.
Area 49 (S4). Swan Bay Jetty. 17 September 1969.

These two stations represent extreme shelter within Port Phillip and are therefore considered together. The station at Swan Bay Jetty is described in detail.

Geology and Geomorphology

The country rock comprises sands, clays, limestone and lignites. The shore is fringed with calcareous sands and dune limestone; the coastal elevation is only a few feet above sea-level in some areas. The floor is a sandy clay derived from these sediments, with a high percentage of shell remains. Around the margin of the Bay there is accumulation of dead and decaying plant material, particularly of *Zostera*, and H_2S is formed.

Swan Bay is protected on its E. margin from the main area of the bay by Swan Island, Duck Island and Edwards Point, which runs S. from the E. shore of the Bellarine Peninsula.

Flora and Fauna

On the W. shore the bay is bordered by a well-developed salt marsh with *Arthrocnemum halocnemoides, Salicornia quinqueflora*, and

TABLE 9. PORT PHILLIP HEADS REGION, Point Nepean (S5)

ZONE	PLANTS	ANIMALS
LITTORAL FRINGE	*Lichina confinis*	*Melarapha unifasciata* *Melarapha praetermissa* *Melarapha paludinella*
UPPER EULITTORAL	*Bangia fuscopurpurea*[1]	*Bembicium nanum* U *Melanerita melanotragus*[2] *Austrocochlea concamerata*[2] *Chamaesipho columna* M *Modiolus pulex*[2] M *Chthamalus antennatus* *Siphonaria diemenensis* L *Austrocochlea constricta* L *Brachidontes rostratus* L
MID-EULITTORAL	*Bryopsis*[1] *Enteromorpha*[1] U *Porphyra*[1] U *Rivularia* M *Petrospongium rugosum*[1] L *Splachnidium rugosum*[1] L *Ulva lactuca*[1]	*Patelloida latistrigata* U *Cominella lineolata* U *Cellana tramoserica* M *Patelloida alticostata* L *Galeolaria caespitosa*[2] L *Actinia tenebrosa*[2] L
LOWER EULITTORAL	*Corallina officinalis* *Hormosira banksii* U *Gelidium pusillum* U *Ulva lactuca* *Caulerpa brownii* L *Cladostephus verticillatus*[1, 3] *Cystophora torulosa* L *Laurencia heteroclada* L *Padina fraseri* L	*Pyura praeputialis*[2] *Poneroplax albida* *Poneroplax costata*
SUB-LITTORAL FRINGE	*Durvillea potatorum* *Ballia scoparia* *Chaetomorpha darwinii* *Halopteris gracilescens* *Lithothamnion* *Xiphophora chondrophylla*	*Dicathais textilosa* *Notohaliotis ruber* *Scutus antipodes*
UPPER SUB-LITTORAL	*Ecklonia radiata*[2] *Macrocystis angustifolia* *Phyllospora comosa* *Amphibolis antarctica*[2, 3]	U = Upper } part M = Middle } of L = Lower } zone [1] = Seasonally abundant [2] = Local shelter [3] = Sand overlying rocky substrate

Suaeda australis as dominant species. *Salicornia* plants are found on small isolated muddy outcrops along the edge of the bay and amongst them are *Salinator fragilis, Velacumantus australis, Austrocochlea constricta porcata* and *Bembicium melanostomum*. This merges with *Zostera muelleri* which extends through the eulittoral and into the sublittoral zone. Associated with the *Zostera* are two other marine angiosperms *Ruppia maritima* and occasionally *Lepilaena cylindrocarpa*. These sea grasses are established in loose sediments and form the substrate for a number of algae including *Enteromorpha, Ulva lactuca, Ceramium, Gracilaria, Polysiphonia*, numerous diatoms and dinoflagellates, and *Phaeocystis giraudii*. In deeper water *Zostera* has associated with it a fauna of amphipods and *Assiminea brazieri* with *Katelysia scalarina* amongst the roots. Near the causeway on the E. side of the bay the dominant species amongst the *Zostera* is *Katelysia rhytiphora*. Under calm conditions debris and shell remains become a substrate for algal growth; *Acetabularia peniculus* is commonly

found attached to dead *Katelysia scalarina* shells.

Animals are sparse, the most abundant and obvious species being *Zeacumantus diemenensis*, some *Austrocochlea contricta*, a few ascidians, *Microcosmos australis*, and a few parchment tubes of *Chaetopteris* sp. protruding from the sand, but no worms were collected. Dead shells of *Katelysia* and *Homalina* are abundant. Stagnant pools which form in the marsh area during winter and spring are characterized by a dense growth of *Enteromorpha*.

In Limeburners Bay at Station 4, the spit running into the bay from the foreshore in front of Geelong Grammar School differs from Swan Bay in two aspects. Firstly the marsh area is separated from the intertidal region by a beach of loosely compacted silty sand with a high proportion of marine skeletal material. Secondly dense beds of sea grass are not developed in the sublittoral.

Algae are poorly represented; the following species were found attached to occasional rocks or posts: *Enteromorpha, Ulva lactuca, Colpomenia sinuosa*, and *Scytosiphon lomentaria*. On posts *Caloglossa leprieurii* occurs near mid-tide. In the upper zones the dominant and only obvious animal was *Bembicium melanostomum*, which then graded into abundant *Eubittium lawleyanum* and finally at low tide *Velacumantus australis*. Hiding among the pebbles and the algae are the crabs *Philyra laevis* and *Paragrapsus gaimardii*.

Discussion

The flora and fauna of the intertidal zones of Port Phillip can be used to divide the bay into two main biological areas, (1) the open coast area of Port Phillip Heads, and (2) the bay proper. This division is not clear cut on the E. margin of the bay.

The major difference between the intertidal zones of the bay and of the Heads is the reduced number of species found within the bay. However, although fewer species occur, the actual population density remains much the same. Most of the bay species also occur at the Heads but the reverse is not true. A number of animals e.g. *Patellanax peroni, Scutus antipodes, Siphonaria funiculata*, are restricted to the open coast. A list of algae found only at the Heads but not in the bay is given in the description of stations 5 and 10, Port Phillip Heads. While a number of species occur throughout the whole bay, others appear to tolerate the conditions of the bay to a limited degree. *Montfortula rugosa* occurs to the S. of Clifton Springs (W. coast) and Schnapper Point (E. coast); *Kellia australis* and *Poneroplax albida* occur on the E. coastline S. of Ricketts Pt. and at the Heads.

In some cases one particular species may be ecologically replaced by another. The green alga *Caulerpa scalpelliformis* occurs at the Heads and on the E. coastline S. of Schnapper Pt., but is completely replaced elsewhere in the bay by the densely pinnate form of *Caulerpa remotifolia*. The mollusc *Bembicium nanum* occurs as far N. as Portarlington (W. coast) and Schnapper Pt. (E. coast) and is then replaced by either *Bembicium auratum* or *B. melanostomum*.

A number of species occur throughout the bay but occupy different ecological niches under the differing environmental conditions. *Meturaplax retrojecta* is intertidal on open coast but occurs at 1·5-3 fm within the bay. *Ibla quadrivalvis* requires the shelter of *Galeolaria caespitosa* at Martha Pt. (E. coast) and the Heads, but within more sheltered parts of the bay occurs in rock crevices adjacent to the *Galeolaria*. Some algae, e.g. *Ecklonia radiata*, which are sublittoral within the bay are restricted to deep pools and other positions of local shelter at the Heads.

Biological zonation within the bay is not as well developed as at the Heads, and with increase in shelter both the sub-littoral fringe and the littoral fringe (spray zone) disappear. Some difficulty is experienced in recognizing zones within the bay area, and this is in part due to the poor development of rocky platforms, and the narrow tidal range (1 m. or less for most of the bay, c.f. approx. 1·7 m at the Heads). With the increase in shelter the algae become more important as zone indicators. However, algae within the bay show marked seasonal fluctuations whereas at the Heads there is a relatively stable cover of *Hormosira banksii* and *Cystophora* species in the lower zones.

References

BENNETT, ISOBEL and POPE, ELIZABETH C., 1960. Intertidal zonation of exposed rocky shores of Tasmania, and its relationship with the rest of Australia. *Aust. J. mar. Freshwat. Res.* 11: 182-221.

BIRD, E. C. F., 1964. *Coastal landforms.* ANU Canberra.

BOWLER, J. M., 1966. Port Phillip Survey 1957-1963. The geology and geomorphology. *Mem. natn. Mus. Vict.* 27: 19-67.

JUTSON, J. T., 1931. Erosion and sedimentation in Port Phillip Bay, Victoria, and their bearing on the theory of a recent relative uplift of the sea floor. *Proc. roy. Soc. Vict.* 43: 130-53.

————, 1940. Shore platforms of Mount Martha, Port Phillip Bay, Victoria, Australia. *Ibid.* 52: 164-74.

WOMERSLEY, H. B. S., 1966. Port Phillip Survey 1957-1963. Algae. *Mem. natn. Mus. Vict.* 27: 133-156.

2. SYSTEMATIC LIST OF INTERTIDAL ANIMALS

By J. HOPE BLACK

The list is of the commoner intertidal animals, and not a definitive record of all species found in the littoral zone. It is biased towards species occupying a rocky substrate, as these reflect ecologic changes more clearly than those from sandy or muddy bottoms. No attempt is made to include the large number of species that live in rock pools and in the sub-littoral.

References have been kept to a minimum as most of the species have been discussed by the various authors in the systematic papers published in this and the previous survey volume. Distribution within the bay is listed and brief remarks made on their ecology.

The additional locality numbers in this section are stations worked but not included on the chart or discussed in Section 1 (Intertidal Ecology) of this paper.

Porifera

It has not been possible to obtain identifications of sponges, but fortunately they are not an important component of the intertidal ecology. Most species are benthic, although several, including *Sycon* and *Tythya corticata* inhabit intertidal pools.

Coelenterata

Hydrozoa. A number of species is found in pools and in the sublittoral, but the group has not been studied in any detail since Bayle worked the material collected by the Royal Society Survey of 1888-95. Recently Mrs J. Watson has made extensive collections which she is now studying. Her results will show to what extent the distribution of this group has changed within the bay.

ACTINIARIA

Actinia australiensis Carlgren, 1950

Actinia australiensis Carlgren 1950 Corallimorpharia, Actinaria and Zoantharia from N.S.W. and S. Qd. *Ark. Zool.* 1 (10): 131-146.

Survey area 27 (S17), 29 (S22), 40 (S6), 42 (S21).

A small brown anemone found under stones in the mid- and lower-eulittoral of rock platforms. In Port Phillip it is often found amongst the *Galeolaria.*

Actinia tenebrosa Farquhar, 1898

Actinia tenebrosa Farquhar, H., 1898. Preliminary account of some New Zealand Actinaria. *Journ. Linn. Soc. Lond. (Zool.)* 26: 535.

Survey area 55 (S13) (S15), 58 (S5) (S10).

Very common on rock platforms in the mid- and lower-eulittoral in areas of moderate exposure. At Daveys Bay on the flat sandstone platform it occurs in large numbers.

Oulactis muscosa (Drayton, 1848)

Metridium muscosum Drayton J., 1848 in J. D. Dana *Wilkes U.S. Exped.* Zoophytes, p. 153.

Survey area 9 (S12).

This brown speckled anemone occurs in the lower eulittoral on rock platforms usually living in cracks and holes where sand and skeletal material has accumulated.

Cnidopus veratra (Drayton, 1848)

Actinia veratra Drayton 1848 in J. D. Dana *Wilkes U.S. Exped.* Zoophytes, p. 129.

Survey area 23 (S20).

This green anemone is found in shallow pools and crevices in the lower eulittoral.

Cerianthus sp.

Survey area 9 (S12).

Burrowing anemone found on sandy mud flats in areas of extreme shelter. A lower eulittoral species in Port Phillip but occurs 5-10 fm in the warmer N.S.W. waters.

ANNELIDA POLYCHAETA

Galeolaria caespitosa Lamarck, 1818

Survey area 6 (S16), 23 (S20), 25 (S19), 27 (S17), 37 (S1), 40 (S6), 48 (S14), 55 (S13) (S15), 58 (S5) (S10), 63 (S24).

Galeolaria occurs as a band at the top of the lower eulittoral on open coasts which afford some shelter. In localities of extreme exposure it is only found where rock stacks or boulders protect it from the full force of the sea. In the bay it is found as a fringe on boulders, favouring the exposed sides.

CRUSTACEA CIRREPEDIA

Ibla quadrivalvis Cuvier, 1817

Ibla quadrivalvis, Cuvier 1817.

Survey area 23 (S20), 40 (S6), 48 (S14), 63 (S24).

A common species living among *Galeolaria* tubes on open coasts, but in the shelter of the bay it forms separate colonies usually in depressions and fissures adjacent to the *Galeolaria.*

Chthamalus antennatus (Darwin, 1854)

Chthamalus antennatus Pope E. C., 1965. A review of Australian and some Indomalayan Chthamalidae. *Proc. Linn. Soc. N.S.W.* 90: 45.

Survey area 58 (S5).

Occurs in the upper eulittoral of open rock platforms in Port Phillip; it does not occur N. of the Nepean Bay Bar.

Chamaesipho columna (Spengler, 1790)

Chamaesipho columna Pope E. C., 1965: 64.

Survey area 25 (S19), 48 (S14), 55 (S13), 58 (S5), 63 (S24), 69 (S11).

Occurs in the upper eulittoral on rock platforms of open coasts, within the bay it is confined to the S. half, but penetrates into Corio Bay North.

Elminius modestus Darwin, 1854

Elminius modestus Pope E. C. Cirripedia, Port Phillip Survey *Mem. natn. Mus. Vict.* 27: 181.

Survey area 63 (S24).

This species occurs from low tide to high water neaps, depending on the configuration of the locality and the degree of exposure.

Tetraclita purpurescens (Wood, 1815)

Lepas purpurescens Wood, 1815. Gen. Conch.

Survey area 58 (S10).

Occurs on rock platforms 'in places sheltered from the sun' (Bennett and Pope 1953: 133). Its occurrence is similar at S10.

ISOPODA

Paridotea munda Hale, 1924

Paridotoe munda Naylor E., 1966. Isopoda, Port Phillip Survey. *Mem. natn. Mus. Vict.* 27: 183.

Survey area 42 (S21).

Paridotea ungulata (Pallas, 1881)

Paridotea ungulata Naylor E., 1966: 183.

Survey area 5.

Crabyzos longicaudatus (Spence Bate, 1888)

Crabyzos longicaudatus Naylor E. 1966 ibid. p. 183.

Survey area 5.

BRACHYURA

Griffin, D. J. G., and Yaldwin, J. C., *Brachyura,* this volume.

Elabia (Phylxia) intermedia Miers, 1886

Survey area 42 (S21).

Philyra laevis Bell, 1885

Survey area 26 (S2), 58 (S3).

This small pebble crab is found on *Zostera* beds from the sublittoral down to several fathoms.

Halicarcinus ovatus Stimpson, 1858

Survey area 10 (intertidal) 42 (S21).

Two species of *Halicarcinus* are common 1-7 fm in Port Phillip Bay, but only this species has been taken in the eulittoral.

Naxia aurita (Latreille, 1825)

Survey area 6 (S16), 40 (intertidal), 42 (intertidal), 58 (S10).

In areas of extreme shelter.

Notomithrax minor (Filhol, 1885)

Survey areas 42 (intertidal), 55 (S. side Schnapper Point, intertidal).

Carcinus maenus Linnaeus, 1758

Survey area 5 (intertidal), 69 (S11).

This introduced European species is common in association with *Zostera* beds throughout the bay.

Nectocarcinus integrifrons (Latreille, 1825)

Survey area 42 (intertidal).

Ovalipes australiensis Stephenson and Rees, 1968

Survey area 9 (S12), 69 (S11), 63 (intertidal Safety Beach).

This swimming crab occurs on *Zostera* beds or sand patches adjacent to them.

Actaea peronii (H. Milne Edwards, 1824)

Survey area 59 (S25).

Pilumnus acer Rathbun, 1923

Survey area 59 (intertidal).

Pilumnus monilifer Haswell, 1881

Survey area 5 (intertidal).

Pilumnopeus serratifrons (Kinahan, 1856)

Survey area 27 (S17).

Litochiera bispinosa Kinahan, 1856

Survey area 42 (intertidal).

This and the above four species are found under stones in the mid- and lower-eulittoral.

Cyclograptus audouinii (H. Milne Edwards, 1837)

Survey area 14 (intertidal, Beaumaris).

Paragrapsus quadridentatus (H. Milne Edwards, 1837)

Survey area 55 (S13).

Paragrapsus gaimardii (H. Milne Edwards, 1837)

Survey area 23 (S20), 26 (S2) (S9), 55 (S13).

A common species living under stones in the mid- and lower eulittoral.

Mictyris platycheles (H. Milne Edwards, 1852)

Survey area 5 (intertidal) 23 (S20).

This soldier crab occurs on firm sandy beaches, and when present is usually very abundant.

MOLLUSCA

Macpherson, J. Hope, and Gabriel, C. J., 1962. *Marine Molluscs of Victoria*, p. 19.

Macpherson, J. Hope, 1966. Mollusca. Port Phillip Survey, *Mem. natn. Mus. Vict.* 27: 201-263.

AMPHINEURA

Poneroplax albida (Blainville, 1825)

Survey area 23 (S20), 58 (S5).

Occurs with *P. costata* in the lower eulittoral.

It appears to be less adapted to sheltered conditions, and has been taken only on the E. side of the bay.

Poneroplax costata (Blainville, 1885)

Survey area 6 (S16), 23 (S20), 40 (S6), 48 (S14), 55 (S13) (S15), 58 (S5), 63 (S24).

In the lower eulittoral below the *Galeolaria*.

Kopionella matthewsi (Iredale, 1920)

Survey area 55.

Under stones in the sub-littoral.

Meturoplax retrojecta (Pilsbury, 1894)

This species is a common crypt-dweller of the lower eulittoral of open coasts, but within Port Phillip it was only taken on reefs at 1·5-3 fm below low tide.

Ischnochiton elongatus (Blainville, 1825)

Survey area 55.

There are several species of Ischnochitonidae living under stones in the sublittoral.

Ischnoradsia evanida (Sowerby, 1840)

Survey area 23 (S20), 55 (intertidal), (S13).

Occurs under stones in the sublittoral of the E. coast of the bay.

GASTROPODA

Notohaliotis ruber (Leach, 1814)

Survey area 55 (S13) (S15), 63 (S24).

This species was common in the sublittoral until commercial fishing by skin divers denuded the population. A number of small specimens up to 2·5 in. (6 cm) in diameter were recorded for the above localities.

Montfortula rugosa (Quoy and Gaimard, 1834)

Survey area 40 (S6). 55 (intertidal), 58 (S5) (S7).

An open coast lower eulittoral species which only occurs in the S. half of the bay.

Scutus antipodes (Montfort, 1810)

Survey area 58, 59.

Only occurs in the region of the Heads where suitable stones afford it shelter.

Cellana tramoserica (Sowerby, 1825)

Survey areas 6 (S16), 7 (S18), 23 (S20), 48 (S14), 55 (S13) (S15), 58 (S5) (S7) (S10), 63 (S24).

A common mid-littoral species which is able to adapt itself to a wide range of conditions, and so occurs on most platforms both within and outside the bay.

Patellanax peroni (Blainville, 1825)

Survey area 58 (S10).

An open coast lower eulittoral species which does not penetrate the Nepean bay bar.

Patelloida alticostata Angas, 1856

Survey areas 6 (S16), 7 (S18), 23 (S20), 48 (S14), 55 (S13) (S15), 58 (S5) (S7) (S10), 63 (S24).

Occupies a similar situation to *Cellana* with a similar range.

Patelloida latistrigata (Angas, 1865)

Survey area 55 (S13) (S15).

Another open coast species that penetrates the bay as far as area 55.

Notoacmea petterdi (Tenison Wood, 1876)

Survey areas 23 (S20), 58 (S10).

Open coast species found on exposed rock surfaces.

Notoacmea granosa (Macpherson, 1954)

Survey areas 55 (S13), 25 (S19).

An open coast species which was recorded by the survey only for the E. coast.

Notoacmea mayi May, 1923

Survey area 55 (S13).

Also an open coast species which penetrates the bay to Mornington on the E. coast.

Notoacmea scabrilirata (Angas, 1865)

Survey area 58 intertidal.

Lives under stones in the mid- and lower-eulittoral.

Cantharidus pulcherrimus (Wood, 1828)

Survey area 58 (S7) (S10).

This species is confined to the Heads region of the bay, living amongst algae.

Phasianotrochus eximius (Perry, 1811)

Survey area 58 (S7).

Like the previous species this is an inhabitant of the intertidal algal beds.

Phasianotrochus rutilus (A. Adams, 1851)

Survey area 58 (S5).

This is a common species in Western Port Bay, but it is rare even in the Heads region of the bay.

Thalotia conica (Gray, 1827)

Survey area 58 (S7) (S10).

Another of the algal dwellers which is confined to the Heads region.

Austrocochlea constricta (Lamarck, 1822)

Survey areas 7 (S18), 23 (S20), 26 (S9) *porcata*, 27 (S17), 37 (S1), 48 (S14), 49 (S4) *porcata*, 55 (S13) (S15), 63 (S24).

This species is common in the upper eulittoral of open rock platforms, and is widely distributed on the platforms within the bay. It also occurs in areas of extreme shelter where it is found on areas of sandy mud such as *Zostera* beds, and at the base of mangrove trees. Specimens in the latter type of habitat are smaller and have been given the varietal name *porcata* (A. Adams, 1851).

Austrocochlea concamerata (Wood, 1828)

Survey areas 55 (S13) (S15), 63 (S24).

An open coast upper eulittoral species which is found in crevices or under overhangs which afford shelter.

Austrocochlea adelaidae (Phillippi, 1849)

Survey areas 6 (S16), 58 (S7) (S10).

This and the next species occur in algal pools from the mid- to lower-eulittoral.

Austrocochlea odontis (Wood, 1828)

Survey areas 6 (S16), 23 (S20), 26 (S9), 58 (S5).

Subninella undulata (Solander, 1786)

Survey areas 23 (S20), 55 (S13) (S15), 58 (S5) (S7) (S10), 63 (S24).

Occurs in crevices and pools in the lower eulittoral.

Micrastraea aurea (Jonas, 1844)

Survey areas 27 (S17), 58 (S10).

This species is common in many situations below low tide to approximately 7 fm. It was taken in the sublittoral at the above stations.

Melanerita melanotragus (A. E. Smith, 1884)

Survey area 55 (S13), 63 (S24).

Occurs in crevices and under overhangs in the upper eulittoral of open coasts. In Port Phillip it is one of the open coast species that penetrates up the E. coast.

Melarapha unifasciata (Gray, 1826)

Survey areas 6 (S16), 25 (S19), 48 (S14), 55 (S13) (S15), 58 (S5) (S10), 63 (S24).

This and the next species are common on vertical rock stacks in the infra-littoral fringe. This species tends to occur a little higher than the following one.

Melarapha praetermissa (May, 1908)

Survey areas 48 (S14), 55 (S13) (S15), 58 (S10), 63 (S24).

Melarapha paludinella (Reeve, 1857)

Survey area 63 (S24).

This very small species occurs on open coast rock platform in the upper eulittoral amongst the barnacle *Chamaesipho columna.* Its situation is similar at Martha Point (S24).

Bembicium nanum (Lamarck, 1822)

Survey areas 48 (S14), 55 (S13) (S15), 58 (S10), 63 (S24).

This is an open coast species and penetrates the bay to S. of Schnapper Point.

Bembicium auratum (Quoy and Gaimard, 1834)

Survey areas 23 (S20), 27 (S17), 37 (S1), 40 (S6), 48 (S14), 55 (S13) (S15).

Occurs in areas of partial shelter where it replaces the above species.

Bembicium melanostomum (Gmelin, 1791)

Survey areas 25 (S18), 26 (S2), 49 (S4).

Occurs in area of extreme shelter attached to any hard substrata including mangrove stems and roots.

Velacumantus australis (Quoy and Gaimard, 1834)

Survey areas 25 (S19), 26 (S2) (S9), 49 (S4).

A common species in sandy mud situations.

Zeacumantus diemenensis (Quoy and Gaimard, 1834)

Survey areas 23 (S20), 26 (S9), 49 (S4).

Found on open sandy mud.

Eubittium lawleyanum (Crosse, 1863)

Survey area 26 (S2).

A sublittoral species found only in extreme shelter.

Cymatiella verrucosa (Reeve, 1844)

Survey area 58 (S7).

This and the following species are inhabitants of open rock platforms where some shelter such as algal growth is available.

Cymatiella lesueuri Iredale, 1929

Survey area 58 (S7).

Lepsiella vinosa (Lamarck, 1822)

Survey areas 6 (S16), 23 (S20), 25 (S19), 40 (S6), 58 (S7) (S10), 63 (S24).

Common in the mid- and lower-eulittoral in association with mussels and *Galeolaria* on which it feeds.

Lepsiella reticulata (Blainville, 1832)

Survey area 58 (S7).

An open coast species.

Dicathais textilosa (Lamarck, 1822)

Survey area 58 (S5) (S7) (S10).

Living in sheltered positions such as crevices and overhangs in the lower eulittoral to several fathoms.

Cominella eburnea (Reeve, 1846)

Survey areas 40 (S6), 6 (S16).

Occurs in sheltered situations in the mid-eulittoral often completely replacing the more open coast species *C. lineolata.*

Cominella lineolata (Lamarck, 1809)

Survey areas 7 (S18), 23 (S20), 25 (S19), 40 (S6), 55 (S13) (S15), 58 (S5) (S7) (S10), 63 (S24).

A widespread species on rock platforms, common in open positions, but penetrates into even well-sheltered bays and inlets.

Parcanassa pauperata (Lamarck, 1822)

Survey areas 23 (S20), 26 (S9), 37 (S1).

A shelter-loving species.

Tavaniotha optata (Gould, 1860)

Survey area 69 (S11).

Occurs in areas of sand and muddy sand from the sublittoral to 9 fm.

Floroconus anemone (Lamarck, 1810)

Survey area 58 (S10).

Occurs under stones in the lower eulittoral in areas of medium shelter.

Salinator fragilis (Lamarck, 1822)

Survey areas 2 (S8), 23 (S20), 40 (S6), 49 (S4).

On sandy mud areas usually in the vicinity of freshwater runnels.

Siphonaria diemenensis (Quoy and Gaimard, 1834)

Survey areas 6 (S16), 40 (S6), 48 (S14), 55 (S13) (S15), 58 (S5) (S7) (S10), 63 (S24).

Common on the upper eulittoral of rock platforms both within the bay and on the open coast.

Siphonaria tasmanica (Tenison Woods, 1876)

Survey area 58 (S10).

In similar situations to the above species, but only found in the Heads region.

Siphonaria funiculata Reeve, 1856

Survey area 58 (S10).

Confined to the S. of the bay.

Siphonaria baconi Reeve, 1856

Survey area 58 (S5) (S7).

On the sheltered side of Point Nepean this species is common on flat rock surfaces in the mid-eulittoral.

Onchidella patelloides (Quoy and Gaimard, 1832)

Survey area 58 (S10).

An open coast rock platform species.

BIVALVIA

Anadara trapezia (Deshayes, 1840)

Survey areas 25 (S18), 26 (S9), 27 (S17).

Occurs in the lower eulittoral on the silty clays and silty sands of the N. shore of Corio Bay.

Modiolus pulex (Lamarck, 1819)

Survey area 58 (S5) (S10).

An open coast mid-eulittoral species.

Brachidontes rostratus (Dunker, 1857)

Survey area 58 (S5) (S10).

Forms extensive beds in the mid-eulittoral on open coast platforms.

Mytilus planulatus (Lamarck, 1819)

Survey areas 2 (S8), 6 (S16), 9 (S12), 23 (S20), 25 (S19), 37 (S1), 40 (S6), 48 (S14), 55 (S13) (S15), 63 (S24), 69 (S11).

Occurs from the lower eulittoral to 10 fathoms in sheltered waters.

Kellia australis (Lamarck, 1818)

Survey area 63 (S24).

Lives in the shelter of *Galeolaria* and mussels on open coasts.

Electroma georgiana (Quoy and Gaimard, 1835)

Survey areas 69 (S11), 27 (S17).

Found within the bay from the sublittoral to 10 fm wherever algae and such like are available for attachment.

Katelysia scalarina (Lamarck, 1818)

Survey area 49 (S4), 69 (S11).

Occurs on sand from the sublittoral to several fathoms.

Katelysia rhytiphora Lamy, 1937

Survey areas 26 (S9), 37 (S1), 49 (S4).

Occurs in association with *Zostera.*

Donacilla angusta (Reeve, 1854)

Survey areas 23 (S20), 69 (S11).

Living in sand in areas of shelter.

Homalina deltoidalis (Lamarck, 1818)

Survey areas 27 (S17), 37 (S1).

Occurs in the sublittoral to 7 fm in areas of extreme shelter.

ECHINODERMATA

Patriella calcar (Lamarck, 1816)

Survey areas 23 (20), 48 (S14), 58 (S10).

Common in rock pools and under stones from the mid-eulittoral to several fathoms.

Patriella brevispina (H. L. Clark, 1923)

Survey area 23 (S20), 58 (S10).

In similar situations to the above species.

Patriella gunni (Gray, 1840)

Survey area 58 (S10).

This and the previous species are often considered to be conspecific, but recent work separates them.

Tosia australis Gray, 1840

Survey areas 25 (S19), 58 (S10).

Under stones in the lower littoral to several fathoms.

Cosmosterias calamaria (Gray, 1840)

Survey area 23 (S20).

A shallow benthic species which from time to time invades the upper sub-littoral.

Heliocidaris erythrogramma (Val., 1846)

Survey area 58 (S10).

This common sea urchin of the Port Phillip intertidal occurs in rock pools in the lower eulittoral and under ledges to several fathoms.

ASCIDIACEA

Pyura praeputialis (Heller, 1878)

Survey areas 40 (S6), 58 (S5).

Occurs in the sublittoral but in some areas of shelter such as gutters, may extend up into the lower eulittoral.

Pyura pachydermatina (Herdman, 1881)

Survey area 58 (S5) (S10).

Attached to rocks, often under overhangs, in the sub-littoral down to several fathoms.

Microcosmos australis Herdman, 1899

Survey areas 9 (S12), 49 (S4).

Occurs on sand and clayey sand in areas of shelter from the sub-littoral down to several fathoms.

3. FLORA OF THE INTERTIDAL REGION

By R. J. KING and SOPHIE C. DUCKER

Introduction

The algae and flowering plants collected during field trips to the 14 intertidal stations are listed. This list is by no means exhaustive, notable omissions being microscopic epiphytic algae.

Unless specifically stated all algae occur in the intertidal regions or the adjacent upper sublittoral.

The distribution within the bay is given according to the region and followed by the area number with the station number in brackets (see above). Short ecological notes, and further distribution records taken from specimens in the Herbarium of the Botany School, University of Melbourne (MELU), are included. Several species which were not recorded for the intertidal zone, but which are common components of the drift have been included in this list.

For each species the full original quotation is cited but not the basionym. Recent monographs dealing with species which occur in Port Phillip Bay are given.

Phylum CHLOROPHYTA
Order ULVALES
Family ULVACEAE

Enteromorpha Link

A number of species of *Enteromorpha* is common throughout the bay, in the eulittoral and upper sub-littoral zones.

Enteromorpha intestinalis (Linnaeus) Link 1820: 5. Bliding 1963: 139, Fig. 87.

N. bay area 6 (S16). Corio Bay area 29 (S22). SW. bay area 42 (S21).

Upper- and mid-eulittoral; also recorded for Altona.

Ulva Thuret

Ulva lactuca auct. (Non Linnaeus). Papenfuss 1960: 306. Bliding 1968: 537, Figs. 1-5.

N. bay area 6 (S16). Corio Bay areas 16 (S23), 25 (S19), 26 (S2), 27 (S17), 29 (S22). SW. bay areas 42 (S21), 49 (S4). E. bay areas 23 (S20), 55 (S13, S15). S. bay area 63 (S24). Port Phillip Heads area 58 (S5, S10).

Widely distributed and common upper eulittoral to sub-littoral. Often epiphytic, particularly on *Zostera*. The species of *Ulva* with the dissected and ribbon-like thallus which Womersley (1966) has noted from the vicinty of the Heads was collected at Portarlington and Queenscliff.

Ulva spathulata Papenfuss 1960: 309, Pl. 3, fig. 15.

Port Phillip Heads area 58 (S10).

Epiphytic on *Cladostephus verticillatus*.

Order CLADOPHORALES
Family CLADOPHORACEAE

Chaetomorpha Kützing

Chaetomorpha aerea (Dillwyn) Kützing 1849: 379.

Corio Bay area 29 (S22). E. bay area 23 (S20). S. bay area 63 (S24). Port Phillip Heads area 58 (S5, S10).

Occasional in mid- and lower-eulittoral pools; at Portarlington dense growth in the lower eulittoral.

Chaetomorpha darwinii (J. D. Hooker) Kützing 1849: 380. Kornmann 1969: 335, Figs. 1-13.

Corio Bay area 25 (S19). Port Phillip Heads area 58 (S5, S10).

Usually epiphytic on *Halopteris* spp., *Cladostephus verticillatus*, and *Gelidium australe* in the lower eulittoral and upper sub-littoral; also in lower eulittoral pools.

Chateomorpha sp.

Corio Bay area 26 (S2).

Intermingled strands in upper eulittoral.

Cladophora Kützing

Cladophora species are recorded throughout the bay but these have not all been identified.

Cladophora fascicularis (Mertens in C. Agardh) Kützing 1843: 268. Sakai 1964: 25, Fig. 8, Pl. 4 (1).

Port Phillip Heads area 58 (S10).

Lower eulittoral channels and sub-littoral fringe. Also recorded for Altona, Werribee and Sandringham.

Cladophora repens (J. Agardh) Harvey 1851: Pl. 236.

Port Phillip Heads area 58 (S10).

Upper eulittoral outer edge of the reef.

Cladophora rugulosa Martens 1866: 112; Sakai 1964: 67, Figs. 31-32, Pl. 15 (1).

Port Phillip Heads area 58 (S5).

Shallow inner sandy pools in mid-eulittoral. Also recorded for Beaumaris and Mt Martha.

Order SIPHONOCLADALES

Family SIPHONOCLADACEAE

Apjohnia Harvey

Apjohnia laetevirens Harvey 1855b: 335. Dawes 1969: 78, Fig. 1.

Port Phillip Heads area 58 (S5, S10).

Lower eulittoral pools. This species is restricted to pools on rough coasts.

Family VALONIACEAE

Dictyosphaeria Decaisne

Dictyosphaeria sericea Harvey 1855a: 565.

Port Phillip Heads area 58 (S5, S10).

On vertical and steep faces in the upper zones of lower eulittoral pools; also in channels open to the lower eulittoral. This species does not occur within the sheltered waters of the bay.

Order CODIALES

Family BRYOPSIDACEAE

Bryopsis Lamouroux

Bryopsis gemellipara J. Agardh 1887: 25.

Port Phillip Heads area 58 (S10).

Epiphytic on *Gelidium australe* in lower eulittoral pools.

Bryopsis hypnoides Lamouroux 1809: 333.

N. bay area 6 (S16). Corio Bay areas 16 (S23), 25 (S19). E. bay area 55 (S13, S15).

Lower eulittoral and occasionally above.

Bryopsis plumosa (Hudson) C. Agardh 1823: 448.

Recorded for Port Phillip Bay. In the W. H. Harvey herbarium (TCD) specimens from Brighton Beach (570F) and Geelong (570G) are under this name. Womersley (1966) records *B. plumosa* from N. bay area 10 (103).

We have found it difficult to differentiate between *B. plumosa* and *B. hypnoides*, and have assigned to *B. hypnoides* only plants where the monoecious character was established (Feldmann 1957).

Bryopsis vestita J. Agardh 1878: 3.

Port Phillip Heads area 58 (S10).

Dense patches in upper eulittoral zone.

Family CODIACEAE

Codium Stackhouse

Codium australicum Silva in Silva and Womersley 1956: 280, Fig. 13, Pl. 2 (2).

Recorded from Pt Nepean in lower eulittoral pools.

Codium capitulatum Silva et Womersley 1956: 263, Fig. 2, Pl. 1 (1).

Port Phillip Heads area 58 (S5).

On vertical and shaded faces in lower eulittoral pools.

Codium duthiae Silva in Silva and Womersley 1956: 275, Fig. 10, Pl. 1 (2).

Port Phillip Heads area 58 (S5, S10). Mid- and lower-eulittoral pools.

Codium fragile (Suringar) Hariot 1889: 32. Silva and Womersley 1956: 282, Fig. 14d.

N. bay area 6 (S16). Corio Bay areas 25 (S19), 27 (S17). E. bay area 23 (S20). Port Phillip Heads area 58 (S5, S10).

All levels from mid-eulittoral to upper sub-littoral, and in mid- and lower-eulittoral pools: sub-littoral plants are often covered by epiphytic

Ceramiales. At the Heads this species is common in the mid-eulittoral in rough positions.

Codium galeatum J. Agardh 1887: 42, Pl. 1, fig. 1. Silva and Womersley 1956: 273, Fig. 9.

Port Phillip Heads area 58 (S5).

Deep lower eulittoral pools; a rough coast species not found within the bay. *Hymenocladia sanguinea* is characteristically epiphytic on *C. galeatum*.

Codium lucasii Setchell in Lucas 1935: 200, Fig. 3; Silva and Womersley 1956: 265, Fig. 3.

Port Phillip Heads area 58 (S10).

Under ledges in lower eulittoral pools and on sides of lower eulittoral channels. Also recorded for Pt Nepean.

Codium muelleri Kützing 1856: 34. Silva and Womersley 1956: 278, Fig. 12.

Recorded for Pt Nepean.

Codium perrinae Lucas 1935: 203, Fig. 4. Silva and Womersley 1956: 267, Fig. 4.

Port Phillip Heads area 58 (S10).

Under ledges in lower eulittoral pools.

Codium pomoides J. Agardh 1894: 100; Silva and Womersley 1956: 271, Fig. 7.

Port Phillip Heads area 58 (S5, S10).

Lower eulittoral pools, under ledges and in crevices. Common in the Heads region but not found within the shelter of the bay.

Order Caulerpales

Family Caulerpaceae

Caulerpa Lamouroux

Caulerpa brownii (C. Agardh) Endlicher 1843: 16.

N. bay area 6 (S16). Corio Bay area 27 (S17). SW. bay area 42 (S21). E. bay areas 23 (S20), 55 (S13, S15). S. bay area 63 (S24). Port Phillip Heads area 58 (S5, S10).

Lower eulittoral, the sub-littoral fringe (at the Heads), and most commonly in the upper sub-littoral; also in lower eulittoral pools and channels.

Caulerpa cactoides (Turner) C. Agardh 1823: 439.

Port Phillip Heads area 58 (S5, S10).

Lower eulittoral pools and channels often associated with *Amphibolis antarctica*. This is an open coast species not recorded within the bay.

Caulerpa flexilis Lamouroux 1813: 283, Pl. 7, fig. 3.

E. bay area 55 (S13). Port Phillip Heads area 58 (S5, S10).

Lower eulittoral, sub-littoral fringe and upper sub-littoral on rock platform; also lower eulittoral pools.

Caulerpa flexilis var. *muelleri* (Sonder) Womersley 1956: 367.

Port Phillip Heads area 58 (S5, S10).

Mid- and lower-eulittoral pools.

Caulerpa geminata Harvey 1855a: 564.

Corio Bay area 27 (S17). E. bay area 55 (S13, S15). S. bay area 63 (S24). Port Phillip Heads area 58 (S5, S10).

Common in the upper sub-littoral, but occasionally in the lower eulittoral, the sub-littoral fringe (at the Heads), and in lower eulittoral pools. Also recorded for Williamstown, Beaumaris, Werribee and Geelong. Womersley (1966) discusses the various ecological forms of *C. geminata* occurring within the bay.

Caulerpa longifolia C. Agardh 1823: 437.

Port Phillip Heads area 58 (S5).

Lower eulittoral pools; uncommon.

Caulerpa longifolia f. *crispata* (Harvey) Womersley 1950: 147.

N. bay area 6 (S16). Corio Bay areas 16 (S23), 27 (S17). Port Phillip Heads area 58 (S5, S10).

Lower eulittoral pools and channels, and upper sub-littoral. While f. *crispata* is common both within the bay and at the Heads, the typical form appears to be confined to open coast.

Caulerpa obscura Sonder 1845: 50.

Port Phillip Heads area 58 (S5, S10).

Lower eulittoral pools on vertical and overhung rock faces; characteristic of such conditions on rough coast and not found within the bay.

Caulerpa papillosa J. Agardh 1872b: 42.

Port Phillip Heads area 58 (S5, S10).

Lower eulittoral pools, occasional in the lower eulittoral. This species has not been recorded within the bay,

Caulerpa remotifolia Sonder 1852: 660.

N. bay area 6 (S16). Corio Bay areas 16 (S23), 25 (S19), 26 (S2), 29 (S22). SW. bay area 42 (S21). E. bay area 55 (S15).

Common in lower eulittoral and upper sub-littoral. Also recorded for Altona and Swan Bay. All specimens collected were very densely pinnate.

Caulerpa scalpelliformis (R. Brown in Turner) C. Agardh 1823: 437.

E. bay area 55 (S13). S. bay area 63 (S24). Port Phillip Heads area 58 (S5, S10).

Upper sub-littoral but also lower eulittoral pools.

Caulerpa simpliciuscula (Turner) C. Agardh 1823: 439.

N. bay area 6 (S16). Corio Bay areas 25 (S19), 27 (S17), 29 (S22). E. bay area 55 (S13, S15). S. bay area 63 (S24). Port Phillip Heads area 58 (S5, S10). Common within the bay in the sub-littoral; mid- and lower-eulittoral pools in rough conditions.

Caulerpa trifaria Harvey 1863: Pl. 261.

Port Phillip Heads area 58 (S10).

Lower eulittoral pools, often associated with *Amphibolis antarctica.*

Family Udoteaceae

Chlorodesmis Harvey et Bailey

Chlorodesmis baculifera (J. Agardh) Ducker 1966: 245; 1965: 151, Figs. 1-4, as *C. bulbosa.*

Recorded from Pt Nepean lower eulittoral pool.

Order Dasycladales

Family Dasycladaceae

Acetabularia Lamouroux

Acetabularia peniculus (R. Brown in Turner) Solms-Laubach 1895: 27, Pl. 2, figs. 2, 6-7.

Corio Bay area 27 (S17). SW. bay areas 42 (S21), 49 (S4).

Lower eulittoral and upper sub-littoral, commonly growing on dead shells of *Katylesia scalarina.* Very common at Swan Bay Jetty; also recorded for W. Rosebud and Blairgowrie.

Phylum Phaeophyta

Order Ectocarpales

Family Ectocarpaceae

Acinetospora Bornet

Acinetospora crinita (Carmichael ex Harvey in J. D. Hooker) Kornmann 1953: 223, Figs. 1-14.

Mornington, Beaumaris, Geelong, Queenscliff.

Epiphytic and epilithic; distributed throughout the mid- and lower-eulittoral in sheltered pools.

Ectocarpus Lyngbye

Ectocarpus fasciculatus Harvey 1841: 40; Russell 1966: 268, Figs. 1-2.

Mornington, Queenscliff.

Epiphytic and epilithic in littoral zone pools; considerable seasonal variation in abundance.

Ectocarpus siliculosus (Dillwyn) Lyngbye 1819: 131; Russell 1966: 275, Figs. 3-4.

Mornington, Geelong.

Epiphytic (probably also epilithic); rare.

Feldmannia Hamel

Feldmannia globifera (Kützing) Hamel 1939: XVII, fig. 61 (g); Cardinal 1964: 57, Figs. 31-32.

Mornington, Queenscliff.

Epilithic and epiphytic; common in littoral zone rock pools but also in the sub-littoral fringe.

Feldmannia lebelii (Areschoug ex Crouan frat.) Hamel 1939: XVII.

Queenscliff.

Epiphytic; common in littoral zone pools.

Giffordia Batters

Giffordia fuscata (Zanardini ex Meneghini) Kuckuck 1961: 140, Figs. 11-16.

Mornington, Beaumaris.

Epilithic; uncommon in the upper sub-littoral zone.

Giffordia granulosa (J. E. Smith) Hamel 1939: XV, fig. 61 (e); Cardinal 1964: 39, Figs. 19-20.

Mornington, Queenscliff.

Usually epiphytic in the mid- and lower-eulittoral and sub-littoral fringe; much seasonal variation in occurrence.

Giffordia intermedia (Rosenvinge) Lund 1959: 48, Fig. 5.

Mornington.

Epilithic and epiphytic in the lower eulittoral and the sub-littoral fringe; uncommon.

Giffordia irregularis (Kützing) Joly 1965: 72, Figs. 111-119.

A species complex; taxonomy, etc., under investigation.

Mornington, Swan Bay, Beaumaris, Geelong, Queenscliff.

Epiphytic and epilithic; common in the littoral zone in pools and damp places, also in the sub-littoral fringe.

Giffordia mitchellae (Harvey) Hamel 1939: XIV, fig. 61 (c, d). Cardinal 1964: 45, Fig. 23.

Mornington, Queenscliff, Beaumaris.

Epilithic and epiphytic; common in the littoral zone pools and sheltered damp positions.

Giffordia sandriana (Zanardini) Hamel 1939: XIV. Cardinal 1964: 37, Fig. 18.

Mornington, Werribee.

Epiphytic, epilithic; uncommon, in the upper sub-littoral zone.

Kuckuckia Hamel

Kuckuckia spinosa (Kützing) Kuckuck 1958: 172, Figs. 1-4.

Mornington.

Epiphytic and epilithic; uncommon in the upper sub-littoral zone.

Pilayella Bory

Pilayella littoralis (Linnaeus) Kjellman 1872: 99.

Mornington, Beaumaris.

Epiphytic and epilithic; common in the lower eulittoral and the upper sub-littoral.

Sorocarpus N. Pringsheim

Sorocarpus micromorus (Bory) Silva 1950: 256.

Mornington.

Epiphytic and epilithic; rare in the upper sub-littoral zone.

Order Sphacelariales

Family Sphacelariaceae

Sphacelaria Lyngbye

Sphacelaria sp.

Port Phillip Heads area 58 (S10).

Shallow lower- and mid-eulittoral pools.

Family Stypocaulaceae

Halopteris Kützing

Halopteris funicularis (Montagne) Sauvageau 1904: 393. Lindauer et al. 1961: 167, Fig. 20.

Recorded for Queenscliff.

Halopteris gracilescens (J. Agardh) Womersley 1967: 202.

Port Phillip Heads area 58 (S5, S10).

Lower eulittoral pools and channels.

Halopteris pseudospicata Sauvageau 1904: 408.

Port Phillip Heads area 58 (S10).

Lower eulittoral and below. Also recorded for Ricketts Pt.

Family Cladostephaceae

Cladostephus C. Agardh

Cladostephus verticillatus (Lightfoot) C. Agardh 1817: XXV. Lindauer et al. 1961: 175, Fig. 24.

Corio Bay area 29 (S22). Port Phillip Heads area 58 (S5, S10).

Occasional in the lower eulittoral, frequent in lower eulittoral pools. Also recorded for Ricketts Pt.

Order Cutleriales

Family Cutleriaceae

Cutleria Greville

Cutleria multifida (J. E. Smith) Greville 1830: 60, Pl. 10.

E. bay area 55 (S15).

Young plants in upper sub-littoral on vertical concrete sea wall within shelter of the Mornington Jetty. Often a significant component of drift at Werribee.

Order Dictyotales

Family Dictyotaceae

Dictyota Lamouroux

Dictyota alternifida J. Agardh 1894: 80.

Recorded from Queenscliff and Pt Nepean.

Dictyota apiculata J. Agardh 1894: 67.

Port Phillip Heads area 58 (S10).

Lower eulittoral pools.

Dictyota dichotoma (Hudson) Lamouroux 1809: 331.

N. bay area 6 (S16). E. bay areas 23 (S20), 55 (S13, S15). S. bay area 63 (S24).

Occasional in the lower eulittoral and upper sub-littoral; sometimes forming a dense cover, e.g. at Ricketts Pt. Also recorded for Queenscliff and Werribee.

Dilophus J. Agardh

Dilophus fastigiatus (Sonder) J. Agardh 1880: 107.

Recorded for Half Moon Bay in the upper sub-littoral.

Lobospira Areschoug

Lobospira biscuspidata Areschoug 1854: 364.

Port Phillip Heads area 58 (S10).

Lower eulittoral pools and channels.

Pachydictyon J. Agardh

Pachydictyon paniculatum (J. Agardh) J. Agardh 1894: 84.

SW. bay area 42 (S21). Port Phillip Heads area 58 (S5, S10).

Upper sub-littoral zone, often epiphytic on *Amphibolis antarctica, Caulocystis cephalornithos* and *Phyllospora comosa.*

Family ZONARIEAE

Dictyopteris Lamouroux

Dictyopteris muelleri (Sonder) Reinbold 1899: 43.

Port Phillip Heads area 58 (S5, S10).

Common in lower eulittoral pools and channels from October to February; occasional in the sub-littoral fringe. Also recorded for Williamstown, Geelong and Ricketts Pt.

Padina Adanson

Padina fraseri (Greville) Greville 1830, synop. XLIV. Gaillard 1968: 21, Pls. 1-2.

Port Phillip Heads area 58 (S5, S10).

Lower eulittoral; also in littoral zone pools.

Taonia J. Agardh

Taonia australasica J. Agardh 1894: 30.

Common in drift at Pt. Wilson and Corio Bay during January and February 1970.

Zonaria C. Agardh

This genus is well represented in the bay but specific identification is impossible since many collections are only represented by young, infertile specimens.

Zonaria sinclarii J. D. Hooker et Harvey 1845: 530.

N. bay area 6 (S16). Port Phillip Heads area 58 (S5).

Occasional in the lower eulittoral.

Zonaria turneriana J. Agardh 1870: 438.

Port Phillip Heads area 58 (S5, S10).

Lower eulittoral pools.

Order CHORDARIALES

Family MYRIONEMATACEAE

Myrionema Greville

Myrionema strangulans Greville 1827: Pl. 300.

Corio Bay area 29 (S22). SW. bay area 42 (S21). Port Phillip Heads area 58 (S5).

Epiphytic and restricted to *Ulva*; common October-February.

Family CORYNOPHLAEACEAE

Corynophlaea Kützing

Corynophlaea cystophorae J. Agardh 1880: 22, Pl. 1 (1).

Port Phillip Heads area 58 (S5).

Epiphytic on *Cystophora moniliformis* in lower eulittoral pools.

Leathesia Gray

Leathesia difformis (Linnaeus) Areschoug 1846: 376.

Port Phillip Heads area 58 (S5).

Associated with *Amphibolis* in lower eulittoral pools; also in the upper sub-littoral zone.

Petrospongium Nägeli

Petrospongium rugosum (Okamura) Setchell et Gardner 1924: 12. MacLennan 1956: 1, Fig. 1.

Port Phillip Heads area 58 (S10).

Outer edge in the mid-eulittoral, slightly above *Hormosira banksii.* Also recorded for Point Nepean.

Family CHORDARIACEAE

Myriogloia Kuckuck

Myriogloia sciurus (Harvey) Kuckuck 1929: 62, Fig. 81.

Port Phillip Heads area 58 (S10).

Mid-eulittoral, growing through sand.

Polycerea J. Agardh

Polycerea nigrescens (Harvey ex Kützing) Kylin 1940: 36, Fig. 20 (A, B), Pl. 7, fig. 16.

Port Phillip Heads area 58 (S5)

Epiphytic on *Amphibolis antarctica.*

Tinocladia Kylin

Tinocladia australis (Harvey) Kylin 1940: 34, Pl. 6, fig. 14.

Port Phillip Heads area 58 (S10).

On rock platform, mid-eulittoral.

Family SPLACHNIDIACEAE

Splachnidium Greville

Splachnidium rugosum (Linnaeus) Greville 1830, synop. XXXVI. Price and Ducker 1966: 261, Figs. 1-3.

Port Phillip Heads area 58 (S5, S10). Occasionally in the mid-eulittoral.

A common species on exposed Victorian coast but never recorded within the shelter of the bay.

Family NOTHEIACEAE

Notheia Harvey et Bailey

Notheia anomala Harvey et Bailey 1851: 371. Nizamuddin and Womersley 1960: 673.

Corio Bay area 29 (S22). Port Phillip Heads area 58 (S5, S10).

Epiphytic on *Hormosira banksii* fringing lower eulittoral pools; uncommon within the Bay even though *Hormosira* is widely distributed.

Order Sporochnales
Family Sporochnaceae
Nereia Zanardini

Nereia australis (Harvey) Harvey 1860: 289, Pl. 188.

Common in the drift at Williamstown and Werribee.

Perithalia J. Agardh

Perithalia caudata (Labillardière) Womersley 1967: 239.

Port Phillip Heads area 58 (S10).

Uncommon in crevices in the upper sub-littoral zone and the sub-littoral fringe.

Order Dictyosiphonales
Family Punctariaceae
Colpomenia (Endlicher) Derbès et Solier

Colpomenia peregrina (Sauvageau) Hamel 1937: 201.

Port Phillip Heads area 58 (S10).

Epiphytic on *Caulocystis uvifera.* Also recorded for Werribee.

Colpomenia sinuosa (Martens ex Roth) Derbès et Solier 1851: 95. Lindauer et al. 1961: 261, Pl. 4 (b).

N. bay area 6 (S16). Corio Bay areas 25 (S19), 26 (S2), 29 (S22). SW. bay area 42 (S21). E. bay area 23 (S20). S. bay area 63 (S24). Port Phillip Heads area 58 (S5, S10).

Lower eulittoral and below, usually epiphytic on *Sargassum, Cystophora* or *Caulocystis* species. Also recorded for Canadian Bay and Werribee.

Petalonia Derbès et Solier

Petalonia fascia (O. E. Müller) Kuntze 1898: 419. Wynne 1969: 17, Figs. 6-8, Pls. 6-13.

Corio Bay area 25 (S19). E. bay areas 23 (S20), 55 (S15).

Epiphytic on *Zostera* in the upper sub-littoral zone and in shallow littoral pools.

Punctaria Greville

Punctaria latifolia Greville 1830: 52.

Corio Bay area 29 (S22). E. bay area 23 (S20).

Epiphytic on *Zostera.*

Scytosiphon C. Agardh

Scytosiphon lomentaria (Lyngbye) Link. Wynne 1969: 32, Pls. 14-17.

We have been unable to ascertain the date and place of publication.

N. bay area 6 (S16). Corio Bay areas 25 (S19), 26 (S2), 29 (S22). E. bay area 23 (S20).

Mainly in mid- and lower-eulittoral pools; occasionally lower-eulittoral zone and below on the platform.

Order Laminariales
Family Lessoniaceae
Macrocystis C. Agardh

Macrocystis angustifolia Bory 1826: 10. Womersley 1954a: 119, Pls. 2, 5-6.

Port Phillip Heads area 58 (S5, S10).

Characteristic of the upper sub-littoral zone; also in deep lower-littoral pools and occasional young plants in the sub-littoral fringe.

Family Alariaceae
Ecklonia Hornemann

Ecklonia radiata (C. Agardh) J. Agardh 1848: 146. Lindauer et al. 1961: 278, Pl. 7.

N. bay area 6 (S16). Corio Bay area 29 (S22). E. bay area 55 (S13, S15). S. bay area 63 (S24). Port Phillip Heads area 58 (S5, S10). Upper sub-littoral zone within the bay, but at the Heads mainly in deep littoral pools. Also recorded for Ricketts Point and Altona.

Order Fucales
Family Durvilleaceae
Durvillea Bory

Durvillea potatorum (Labillardière) Areschoug 1854: 343.

Port Phillip Heads area 58 (S5).

Characteristic of the sub-littoral fringe. Common outside the Heads region but not found within the bay.

Family Hormosiraceae
Hormosira (Endlicher) Meneghini

Hormosira banksii (Turner) Decaisne 1842: 331. Lindauer et al. 1961: 320, Pls. 16, 25.

N. bay area 6 (S16). Corio Bay area 29 (S22). SW. bay area 42 (S21). E. bay area 23 (S20). S. bay area 63 (S24). Port Phillip Heads area 58 (S5, S10). Characteristic of the lower eulittoral, although common in pools with epiphytic *Notheia anomala.* Apparently absent from the W. side of the bay.

Family FUCACEAE

Xiphophora Montagne

Xiphophora chondrophylla (R. Brown ex Turner) Montagne ex Harvey 1855c: 215. Nizamuddin 1964: 1, Figs. 1, 3, 5-8.

Port Phillip Heads area 58 (S5, S10).

Lower eulittoral and sub-littoral fringe; also in lower eulittoral pools.

Family SEIROCOCCACEAE

Phyllospora C. Agardh

Phyllospora comosa (Labillardière) C. Agardh 1839: 311, Pl. 28, fig. 11. Nizamuddin 1968: 81, Figs. 1-18, Pl. 1.

Port Phillip Heads area 58 (S5, S10).

Common in the upper sub-littoral at the Heads; not recorded within the bay. Occasionally young plants occur in deep pools, and in the sub-littoral fringe.

Family CYSTOSEIRACEAE

Acrocarpia Areschoug

Acrocarpia paniculata (Turner) Areschoug 1854: 336. Womersley 1964: 98, Fig. 42, Pl. 14 (2).

Port Phillip Heads area 58 (S10).

Confined to deep lower eulittoral pools on the outer edge of the reef.

Caulocystis Areschoug

Caulocystis cephalornithos (Labillardière) Areschoug 1854: 335. Womersley 1964: 102, Figs. 46-47, Pl. 16.

N. bay area 6 (S16). Corio Bay area 29 (S22). SW. bay area 42 (S21). E. bay area 23 (S20). Port Phillip Heads area 58 (S5, S10). Lower eulittoral pools, occasionally in the lower eulittoral and upper sub-littoral zones.

Caulocystis uvifera (C. Agardh) Areschoug 1854: 335. Womersley 1964: 101, Fig. 45, Pl. 15 (2).

Corio Bay area 27 (S17). SW. bay area 42 (S21). E. bay area 55 (S15). Port Phillip Heads area 58 (S10).

Lower eulittoral to upper sub-littoral, particularly with local shelter.

Cystophora J. Agardh

Cystophora congesta Womersley et Nizamuddin in Womersley 1964: 86, Fig. 30, Pl. 9 (2).

N. bay area 6 (S16). Port Phillip Heads area 58 (S10).

Lower eulittoral pools, and sub-littoral fringe.

Cystophora moniliformis (Esper) Womersley et Nizamuddin in Womersley 1964: 71, Fig. 6, Pl. 3 (1).

E. bay areas 23 (S20), 55 (S13). S. bay area 63 (S24). Port Phillip Heads area 58 (S5, S10).

Common in the sub-littoral fringe at the Heads, mainly upper sub-littoral within the bay; also in lower eulittoral pools.

Cystophora polycystidea Areschoug ex J. Agardh 1848: 240. Womersley 1964: 73, Figs. 10-11, Pl. 4 (2).

N. bay area 6 (S16). Corio Bay areas 27 (S17), 29 (S22).

Almost always in the upper sub-littoral zone, but occasionally in larger pools; also recorded for Werribee.

Cystophora retorta (Mertens) J. Agardh. 1848: 243. Womersley 1964: 92, Figs. 34-35, Pl. 11 (1-2).

N. Bay area 6 (S16). SW. bay area 42 (S21). E. bay areas 23 (S20), 55 (S13). S. bay area 63 (S24). Port Phillip Heads area 58 (S5, S10).

Characteristically in lower eulittoral pools, but also lower eulittoral channels, the sub-littoral fringe and the upper sub-littoral; also recorded for Werribee.

Cystophora siliquosa J. Agardh 1870: 445. Womersley 1964: 93, Fig. 36, Pl. 12 (1).

Port Phillip Heads area 58 (S5, S10).

Lower eulittoral zone and below; characteristic of the sub-littoral fringe under conditions of local shelter. Not recorded within the bay.

Cystophora subfarcinata (Mertens) J. Agardh 1848: 240; Womersley 1964: 95, Figs. 38-40, Pl. 13.

SW. bay area 42 (S21). E. bay areas 23 (S20), 55 (S13). S. bay area 63 (S24). Port Phillip Heads area 58 (S5, S10).

Lower eulittoral and below; also in lower eulittoral pools.

Cystophora torulosa (R. Brown ex Turner) J. Agardh 1848: 243; Womersley 1964: 85, Figs. 28-29, Pl. 9 (1).

E. bay area 55 (S13). S. bay area 63 (S24). Port Phillip Heads area 58 (S5, S10).

Characteristic of the lower eulittoral at the Heads; upper sub-littoral within the bay.

Family SARGASSACEAE

Sargassum C. Agardh

A number of species of this genus is common throughout the bay but is usually represented only by basal parts of the thallus. These are often common in the upper sub-littoral but never dominant.

Sargassum decipiens (R. Brown ex Turner) J. Agardh 1872b: 63. Womersley 1954b: 348, Fig. 1 (e-f), Pl. 4 (1).

Corio Bay area 29 (S22). SW. bay area 42 (S21). Port Phillip Heads area 58 (S5, S10).

Lower eulittoral and below; occasionally in lower eulittoral pools.

Phylum RHODOPHYTA

Order BANGIALES

Family BANGIACEAE

Bangia Lyngbye

Bangia fuscopurpurea (Dillwyn) Lyngbye 1819: 83. Sommerfeld and Nichols 1970: 640, Figs. 1-28.

N. bay area 6 (S16). Corio Bay area 29 (S22). Port Phillip Heads area 58 (S10).

Upper eulittoral and into the littoral fringe.

Porphyra C. Agardh

Porphyra sp.

N. bay area 6 (S16). Corio Bay areas 25 (S19), 29 (S22). E. bay area 23 (S20). Small plants common in the mid-eulittoral, large plants in lower eulittoral and the supper sub-littoral; it is possible that these are two different species. Seasonally abundant June-December.

Order NEMALIALES

Family HELMINTHOCLADIACEAE

Helminthocladia J. Agardh

Helminthocladia australis Harvey 1863, Pl. 272. Womersley 1965b: 470, Figs. 46-53, Pl. 5.

Port Phillip Heads area 58 (S10).

Mid-eulittoral pool.

Helminthocladia dotyi Womersley 1965b: 465, Figs. 23-31, Pl. 3 (2).

Port Phillip Heads area 58 (S5).

Common in patches, lower eulittoral.

Helminthora J. Agardh

Helminthora australis J. Agardh ex Levring 1953: 497, Figs. 27-30; Womersley 1965b: 461, Figs. 17-22, Pls. 2 (2), 3 (1).

Port Phillip Heads area 58 (S10).

Epiphytic on *Amphibolis antarctica*, in lower eulittoral pools and the upper sub-littoral.

Liagora Lamouroux

Liagora harveyiana Zeh 1912: 270; Womersley 1965b: 480, Figs. 63-69, Pl. 7 (1).

Port Phillip Heads area 58 (S5, S10).

Lower eulittoral and in pools.

Liagora wilsoniana Zeh 1912: 269; Womersley 1965b: 483, Figs. 70-75, Pl. 7 (2).

Port Phillip Heads area 58 (S5).

Lower eulittoral zone.

Nemalion Targioni-Tozzetti

Nemalion elminthoides (Velley) Batters 1902: 59. Womersley 1965b: 455, Figs. 1-9, Pl. 1.

Port Phillip Heads area 58 (S10).

Upper eulittoral zone attached to jetty piles. Also recorded from Pt. Nepean and Mt. Eliza.

Family CHAETANGIACEAE

Galaxaura Lamouroux

Galaxaura marginata (Ellis et Solander) Lamouroux 1816: 264 (Syn. *G. laxa* Kjellman 1900: 71).

Port Phillip Heads area 58 (S5).

Rare in pools in the sub-littoral fringe. Also recorded from lower-eulittoral pools.

Order GELIDIALES

Family GELIDIACEAE

Gelidium Lamouroux

Gelidium australe J. Agardh 1872a: 30.

Port Phillip Heads area 58 (S5, S10).

Sub-littoral fringe and also lower-eulittoral pools.

Gelidium glandulaefolium J. D. Hooker et Harvey 1847: 406.

Port Phillip Heads area 58 (S5).

Lower-eulittoral zone in crevices.

Gelidium pusillum (Stackhouse) Le Jolis 1963: 139.

N. bay area 6 (S16), Corio Bay areas 25 (S19), 27 (S17). E. bay area 23 (S20), Port Phillip Heads area 58 (S5, S10).

Mainly confined to the lower eulittoral but with isolated occurrences in the mid-eulittoral, particularly in crevices; often associated with *Galeolaria caespitosa*.

Pterocladia J. Agardh

Pterocladia capillacea (Gmelin) Bornet et Thuret 1876: 57.

Port Phillp Heads area 58 (S5).

Sub-littoral fringe.

Order CRYPTONEMIALES
Family SQUAMARIACEAE
Ethelia Weber-van Bosse

Ethelia australis (Sonder) Weber-van Bosse 1921: 300.

Recorded from Queenscliff.

Family CORALLINACEAE
Amphiroa Lamouroux

Amphiroa beauvoisii Lamouroux 1816: 299; Hamel and Lemoine 1953: 42, Pl. 5 (1, 7).

E. bay area 55 (S15). Port Phillip Heads area 58 (S5).

Upper sub-littoral zone and eulittoral zone pools.

Corallina Linnaeus

Corallina officinalis Linnaeus 1758: 805 (see Johansen 1969: 63). Johansen 1970, p. 79, Figs. 1, 3, 5-6, 9, 11.

N. bay area 6 (S16). Corio Bay area 29 (S22). E. bay areas 23 (S20), 55 (S13, S15). S. bay area 63 (S24). Port Phillip Heads area 58 (S5, S10).

Common in the lower eulittoral, sub-littoral fringe (at the Heads) and the upper sub-littoral, where occasionally dominant. Also lower eulittoral pools.

Haliptylon (Decaisne) Johansen

Haliptylon subulata (Ellis et Solander) Johansen 1970, p. 79, Figs. 10, 12.

Port Phillip Heads area 58 (S5, S10).

Lower eulittoral pools and channels, and the lower-eulittoral zone.

Jania Lamouroux

Jania fastigiata Harvey 1847: 107.

Port Phillip Heads area 58 (S5, S10).

Shallow littoral pools; also the lower-eulittoral zone and the sub-littoral fringe.

Lithothamnion Philippi

Lithothamnion muelleri Lenormand in Rosanoff 1866: 101, Pl. 6, figs. 8-11; see Foslie and Printz 1929: 43, Pl. 7 (1-10).

Epiphytic on *Amphibolis antarctica.*

Lithothamnion sp.

N. bay area 6 (S16). E. bay areas 23 (S20), 55 (S13, S15). S. bay area 63 (S24). Port Phillip Heads area 58 (S5, S10).

In pools and on the platform, lower eulittoral and below; often forming an almost complete cover in the upper sub-littoral where associated with *Corallina officinalis.*

Metagoniolithon Weber-van Bosse

Metagoniolithon charoides (Lamouroux) Weber-van Bosse 1904: 102, Pl. 15 (11).

Port Phillip Heads area 58 (S10).

Occasional in lower-eulittoral pools.

Metagoniolithon stelligerum (Lamarck) Weber-van Bosse 1904: 103, Pl. 15 (9 and 13).

Port Phillip Heads area 58 (S5, S10).

Epiphytic on *Amphibolis antarctica* in lower-eulittoral pools.

Family CRYPTONEMIACEAE
Grateloupia C. Agardh

Grateloupia filicina var. *luxurians* A. et E. S. Gepp 1906: 259.

This variety of *Grateloupia filicina* (Lamouroux) C. Agardh 1822: 223 is abundant near sewerage outlets. A similar observation has been made in England (Farnham and Irvine 1968).

N. bay area 6 (S16). Corio Bay areas 16 (S23), 27 (S17), 29 (S22). Port Phillip Heads area 58 (S10).

Common in the lower eulittoral and upper-sub-littoral but at Queenscliff restricted to lower-eulittoral pools. Also recorded for Ricketts Pt and Newport.

Order GIGARTINALES
Family GRACILARIACEAE
Gracilaria Greville

Gracilaria verrucosa (Hudson) Papenfuss 1950: 195.

Corio Bay area 27 (S17). SW. bay area 49 (S4). S. bay area 63 (S24).

Found in lower eulittoral and below, also in shallow rock pools.

Family PLOCAMIACEAE
Plocamium Lamouroux

Plocamium angustum (J. Agardh) J. D. Hooker et Harvey 1847: 404.

Port Phillip Heads area 58 (S5).

Occasional in lower-eulittoral pools, and in the upper sub-littoral. Also recorded for Ricketts Pt.

Plocamium leptophyllum Kützing 1849: 885.

Port Phillip Heads area 58 (S5, S10).

Occasional in lower-eulittoral pools.

Family Rhabdoniaceae

Rhabdonia Harvey

Rhabdonia robusta (Greville) J. Agardh 1851: 355.

Corio Bay areas 27 (S17), 29 (S22).

Found in the lower eulittoral and upper sub-littoral; also recorded for Ricketts Pt.

Rhabdonia verticillata Harvey 1863: Pl. 299.

Corio Bay area 27 (S17).

Occurs infrequently in the upper sub-littoral zone.

Family Hypneaceae

Hypnea Lamouroux

Hypnea sp.

Corio Bay area 27 (S17).

Uncommon in the upper sub-littoral.

Family Mychodeaceae

Mychodea Harvey

Mychodea hamata Harvey 1860: 323.

Port Phillip Heads area 58 (S10).

Pools and channels in the lower eulittoral.

Family Dicranemaceae

Dicranema Sonder

Dicranema grevillei Sonder 1845: 56.

Port Phillip Heads area 58 (S5, S10).

Epiphytic on *Amphibolis antarctica.*

Family Acrotylaceae

Acrotylus J. Agardh

Acrotylus australis J. Agardh 1849: 87.

Corio Bay area 29 (S2). Port Phillip Heads 58 (S10).

Uncommon in the lower eulittoral and upper sub-littoral.

Family Gigartinaceae

Gigartina Stackhouse

Gigartina brachiata Harvey 1860: 325.

Corio Bay area 27 (S17).

Rare in upper sub-littoral.

Rhodoglossum J. Agardh

Both *Rhodoglossum foliiferum* (Harvey) J. Agardh 1876: 186 and *Rhodoglossum proliferum* J. Agardh 1885: 27 are recorded for Port Phillip Bay. Specimens collected on this survey are not easily assigned to either species, the limits of which are obscure and may even overlap.

Corio Bay areas 27 (S17), 29 (S22).

Common in upper sub-littoral and lower-eulittoral zones, particularly near waste outfall pipes. Also recorded for Altona and Werribee.

Order Rhodymeniales

Family Rhodymeniaceae

Botryocladia (J. Agardh) Kylin

Botryocladia obovata (Sonder) Kylin 1931: 18.

Port Phillip Heads area 58 (S5, S10).

Although common in the sub-littoral zone within the bay this species is restricted at the Heads to lower-eulittoral pools and channels.

Gloioderma J. Agardh

Gloioderma wilsone (J. Agardh) De Toni 1900: 496 as *G. wilsonis.*

Port Phillip Heads area 58 (S5).

Rare in lower eulittoral pools.

Hymenocladia J. Agardh

Hymenocladia sanguinea (Harvey) Sparling 1957: 370, Pl. 58 (a-e).

Characteristically epiphytic on *Codium galeatum* in the Port Phillip Heads region.

Family Lomentariaceae

Champia Desveaux

Champia affinis (J. D. Hooker et Harvey) J. Agardh 1876: 304.

SW. bay area 42 (S21).

Epiphytic on *Zostera* in the lower eulittoral.

Champia tasmanica Harvey 1844a: 407, Pl. 19.

Port Phillip Heads area 58 (S10).

Occasional in lower-eulittoral pools.

Order Ceramiales

Family Ceramiaceae

Amoenothamnion Wollaston

Amoenothamnion planktonicum Wollaston 1968: 377, Fig. 35 (D-Q), Pl. 10.

Port Phillip Heads area 58 (S10).

Lower-eulittoral pools.

Antithamnion Nägeli

Antithamnion hanowioides (Sonder) De Toni 1903: 1398. Wollaston 1968: 295, Fig. 19.

Port Phillip Heads area 58 (S10).

Lower-eulittoral pools.

Ballia Harvey

Ballia callitricha (C. Agardh) Kützing 1843: 293. Wollaston 1968: 308, Fig. 21 (A-I).

Port Phillip Heads area 58 (S5).

Sub-littoral fringe and the upper sub-littoral zone; also recorded from Queenscliff.

Ballia scoparia (J. D. Hooker et Harvey) Harvey 1860: 333. Wollaston 1968: 317, Fig. 23 (A-L).

Port Phillip Heads area 58 (S5, S10).

Common in the sub-littoral fringe and the upper sub-littoral zone; occasional in lower-eulittoral pools.

Bornetia Thuret

Bornetia sp.

Port Phillip Heads area 58 (S10).

Lower-eulittoral pools.

Callithamnion Lyngbye

Although *Callithamnion* species occur throughout the bay, none was recorded in this survey.

Centroceras Kützing

Centroceras clavulatum (C. Agardh) Montagne 1846: 140. Hommersand 1963: 241, Figs. 29-30a.

N. bay area 6 (S16). Corio Bay areas 16 (S23), 27 (S17), 29 (S22). Port Phillip Heads area 58 (S10).

Occurs throughout the bay as a conspicuous component of the lower eulittoral.

Ceramium Roth

Ceramium spp.

Corio Bay area 27 (S17). SW. bay areas 42 (S21), 49 (S4). E. bay area 23 (S20). Port Phillip Heads area 58 (S10).

Lower eulittoral and below.

Crouania J. Agardh

Crouania sp.

Port Phillip Heads area 58 (S10).

Uncommon in the sub-littoral fringe.

Griffithsia C. Agardh

Several unidentified species of *Griffithsia* are recorded for Port Phillip.

Griffithsia teges Harvey 1855a: 559.

Recorded for Newport and Point Nepean. Occasionally in drift in the N. bay.

Haloplegma Montagne

Haloplegma preissii (Harvey) Sonder 1846: 171.

Recorded for Queenscliff.

Lophothamnion J. Agardh

Lophothamnion comatum J. Agardh 1892: 43.

Port Phillip Heads area 58 (S5).

Common in shallow littoral pools.

Corynospora J. Agardh

Corynospora griffithsioides (Sonder) Kylin 1956: 583.

Corio Bay area 27 (S17).

Occasional in the upper sub-littoral; also recorded for Werribee.

Ptilocladia Sonder

Ptilocladia pulchra Sonder 1845: 53.

Recorded for Queenscliff and Point Nepean.

Family DELESSERIACEAE

Acrosorium Zanardini in Kützing

Acrosorium uncinatum (Turner) Kylin 1924: 78, Fig. 61.

Corio Bay area 29 (S22). SW. bay area 42 (S21). Port Phillip Heads area 58 (S10).

Commonly epiphytic, particularly on *Zostera*; also a conspicuous component of drift on the W. margin of the bay.

Caloglossa (Harvey) J. Agardh

Caloglossa leprieurii (Montagne) J. Agardh 1876: 499. Papenfuss 1961: 8, Figs. 1-30.

Corio Bay areas 25 (S19), 26 (S2).

Occurs in the mid- and lower-eulittoral mixed with *Galeolaria caespitosa*. This species is generally regarded as characteristic of salt marsh, commonly attached to mangrove pneumatophores, e.g. as at Tooradin, Western Port Bay, Vic.

Phitymophora J. Agardh

Phitymophora amansioides (Sonder) Womersley 1965a: 436.

Port Phillip Heads area 58 (S10).

Occasional, epiphytic in the sub-littoral fringe.

Family DASYACEAE

Dasya C. Agardh

Dasya capillaris J. D. Hooker et Harvey in Harvey 1847: 60, Pl. 19.

Corio Bay area 27 (S17). SW. bay area 42 (S21).

Upper sub-littoral zone; also recorded from Swan Bay.

Dasya villosa Harvey 1844b: 433.

Often found in drift throughout the bay.

Family RHODOMELACEAE

Brongniartella Bory

Brongniartella australis (C. Agardh) Schmitz 1893: 218.

Recorded in the upper sublittoral at Altona and Werribee; also in drift.

Coeloclonium J. Agardh

Coeloclonium opuntioides (Harvey) J. Agardh 1876: 640.

Common in drift at St. Leonards, Queenscliff and Pt Neapean.

Dictyomenia Greville

Dictyomenia tridens (Martens ex Turner) Greville, 1830; synop. LI.

Corio Bay area 27 (S17).

Epizooic on *Pyura* in the lower-eulittoral zone.

Laurencia Lamouroux

Laurencia botryoides (Turner) Gaillon 1828: 363.

Port Phillip Heads area 58 (S5).

Occasional plants throughout the lower eulittoral.

Laurencia elata (C. Agardh) Harvey 1847: 81, Pl. 33 (b).

Port Phillip Heads area 58 (S5, S10).

Occurs mainly in the sub-littoral fringe, but also in lower eulittoral pools.

Laurencia heteroclada Harvey 1855a: 544. Cribb 1958: 175, Pl. 10, figs. 1-11, Pl. 13, fig. 4.

SW. bay area 42 (S21). E. bay area 55 (S13). Port Phillip Heads area 58 (S5, S10).

Lower-eulittoral zone; also in the sub-littoral fringe and pools. Young *Laurencia* plants which are possibly *L. heteroclada* are found throughout the bay.

Laurencia tasmanica J. D. Hooker et Harvey in Harvey 1847: 84.

Corio Bay area 29 (S22). SW. bay area 42 (S21). Lower eulittoral.

Lenormandia Sonder

Lenormandia prolifera (C. Agardh) J. Agardh 1863: 1103.

Port Phillip Heads area 58 (S5, S10).

Sandy lower-eulittoral pools and channels.

Lophurella Schmitz

Lophurella periclados (Sonder) Schmitz in Schmitz and Falkenberg 1897: 441.

Corio Bay area 29 (S22). Port Phillip Heads area 58 (S5, S10).

Lower eulittoral and below.

Polysiphonia Greville

Polysiphonia spp.

N. bay area 6 (S16). Corio Bay areas 16 (S23), 27 (S17), 29 (S22). SW. bay areas 42 (S21), 49 (S4). E. bay area 23 (S20). Port Phillip Heads area 58 (S10).

Common in association with *Centroceras clavulatum* in the lower eulittoral.

Polysiphonia blandi Harvey 1862: Pl. 184.

Port Phillip Heads area 58 (S10).

Lower eulittoral, at higher levels on outer edge of the platform.

Protokützingia Falkenberg

Protokützingia australasica (Montagne) Falkenberg in Schmitz and Falkenberg 1897: 469.

Corio Bay area 29 (S22).

Uncommon in the upper sub-littoral and lower eulittoral.

Phylum CYANOPHYTA

Order NOSTOCALES

Family OSCILLATORIACEAE

Lyngbya C. Agardh ex Gomont

Lyngbya sp.

Corio Bay area 27 (S17).

Covering rocks in upper eulittoral.

Family RIVULARIACEAE

Calothrix C. Agardh

Calothrix confervicola (Roth) C. Agardh 1824: 70.

Epiphytic on *Myriogloia sciurus*.

Rivularia C. Agardh

Rivularia firma Womersley 1946: 130, Fig. 2 (a,b).

S. bay area 63 (S24).

Uncommon in the mid-eulittoral. Also recorded for Pt Nepean.

Phylum CHRYSOPHYTA

Order PRYMNESIALES

Family PHAEOCYSTACEAE

Phaeocystis Lagerheim

Phaeocystis giraudii (Derbès et Solier) Lagerheim 1893: 32.

SW. bay area 49 (S4).

Colonies epiphytic and free floating in *Zostera* beds, during winter months.

LICHENS

Lichina C. Agardh

Lichina confinis (Müller) C. Agardh 1820: 105.

S. bay area 63 (S24). Port Phillip Heads area 58 (S5, S10).

Littoral fringe but also in the upper eulittoral under sheltered conditions.

ANGIOSPERMAE (Flowering Plants)

MONOCOTYLEDONEAE

Family ZOSTERACEAE

The Sea Grasses of the World Den Hartog (1970), covers most of the taxa listed below.

Zostera Linnaeus

Zostera muelleri Irmisch ex Ascherson 1867: 168.

N. bay area 6 (S16). Corio Bay areas 25 (S19), 27 (S17), 29 (S22). SW. bay areas 42 (S21), 49 (S4). E. bay area 23 (S20). Port Phillip Heads area 58 (S10).

Common in lower eulittoral and upper sublittoral on flat, sandy or muddy areas; also in shallow sandy or muddy pools. Often densely covered with epiphytes.

Family RUPPIACEAE

Ruppia Linnaeus

Ruppia maritima Linnaeus 1753: 127.

SW. bay area 49 (S4).

In upper sub-littoral associated with *Zostera* and *Lepilaena cylindrocarpa.*

Family ZANNICHELLIACEAE

Amphibolis C. Agardh

Amphibolis antarctica (Labillardière) Sonder et Ascherson ex Ascherson 1867: 164.

Port Phillip Heads area 58 (S5, S10).

Occurs in shallow, sandy lower-eulittoral pools and channels, and in the sub-littoral zone. This species is not recorded in the sheltered waters of the bay.

Lepilaena Drummond ex Harvey

Lepilaena cylindrocarpa (Körnicke ex Walpers) Bentham 1878: 180.

SW. bay area 49 (S4).

DICOTYLEDONEAE

Family CHENOPODIACEAE

Salicornia Linnaeus

Salicornia quinqueflora Bunge ex Ungern-Sternberg 1866: 59.

(Syn. *S. australis* Solander ex Bentham 1870: 205).

N. bay area 6 (S16). Corio Bay area 27 (S17). SW. bay area 49 (S4). E. bay area 23 (S20).

This typical salt marsh plant seems to be capable of existence in small pockets of soil in the top of the upper-eulittoral zone.

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References

AGARDH, C. A., 1817. *Synopsis algarum scandinaviae* ... Lund, xl + 135 pp.

————, 1820. *Species algarum*...Vol. 1 (1), Lund, 168 pp.

————, 1822. *Species algarum*... Vol. 1 (2), Lund, 169-398.

————, 1823. *Species algarum*... Vol. 1 (2), Lund, 399-531.

————, 1824. *Systema algarum.* Lund. xxxviii + 312 pp.

————, 1839. Revision der Algengattung *Macrocystis. Nova Acta Acad. Caesar. Leop. Carol.* 19: 281-317.

AGARDH, J. G., 1848. *Species genera et ordines algarum* ... Vol. 1, Lund. viii + 363 pp.

————, 1849. Algologiska Bidrag. *Ofvers. K. Vetensk-Akad. Förh.* 6: 79-89.

————, 1851. *Species genera et ordines algarum* ... Vol. 2 (2: 1), Lund, pp. 337-505.

————, 1863. *Species genera et ordines algarum* ... Vol. 2 (3: 2), Lund, 787-1291.

————, 1870. Om Chatham-öarnes Alger. *Ofvers. K. Vetensk-Akad. Förh.* 27: 435-456.

————, 1872a. Bidrag till florideernes systematik. *Acta Univ. lund.*, 8 (Afd. 2, No. 6): 1-60.

————, 1872b. Till algernes systematik. Nya bidrag. *Acta Univ. lund.* 9 (Afd. 2, No. 8): 1-71.

————, 1876. *Species genera et ordines algarum* ...Vol. 3 (1). *Epicrisis systematis floridearum.* Leipzig, vii + 724 pp.

————, 1878. De Algis Novae Zelandiae marinis. *Acta Univ. lund.* 14 (Afd. 2, No. 4): 1-32.

————, 1880. Till algernes systematik. Nya bidrag. *Acta Univ. lund.* 17 (Afd. 3, No. 4): 1-134 + 2.

————, 1885. Till algernes systematik. Nya bidrag. *Acta Univ. lund.* 21 (Afd. 3, No. 8): 1-117 + 3.

————, 1887. Till algernes systematik. Nya bidrag. *Acta Univ. lund.* 23 (Afd. 3, No. 2): 1-174 + 6.

————, 1892. Analecta Algologica. *Acta Univ. lund.* 28 (Afd. 2, No. 6): 1-182.

————, 1894. Analecta Algologica, Cont. I. *Acta Univ. lund.* 29 (Afd. 2, No. 9): 1-144.

ARESCHOUG, J. E., 1846. Enumeratio phycearum in maribus Scandinaviae crescentium, Sectio prior, Fucaceas continens. *Nova Acta R. Soc. Scient. upsal.* 13: 223-382.

————, 1854. Phyceae novae et minus cognitae in maribus extraeuropaeis collectae. *Acta R. Soc. Scient. upsal.*, Ser. 3, 1: 329-372.

ASCHERSON, P., 1867. Vorarbeiten zu einer Uebersicht der phanerogamen Meergewächse. *Linnaea* 35: 152-208.

BATTERS, E. A. L., 1902. A catalogue of the British marine algae, . . . *J. Bot., Lond.* 40 (Suppl.): 2 + 107.

BENTHAM, G., 1870. *Flora Australiensis Vol. 5*, London, viii + 599 pp.

————, 1878. *Flora Australiensis* Vol. 7. London, xii + 806 pp.

BLIDING, C., 1963. A critical survey of European taxa in Ulvales 1. *Capsosiphon, Percursaria, Blidingia, Enteromorpha. Op. bot. Soc. bot. Lund.*, 8 (3): 1-160.

————, 1968. A critical survey of European taxa in Ulvales 2. *Ulva, Ulvaria, Monostroma, Kornmannia. Bot. Notiser* 121: 535-629.

BORNET, É., and THURET, G., 1876. Notes algologiques . . . Fasc. 1. Paris, xx + 70 + 2.

BORY de Saint-Vincent, J. B., 1826. Macrocyste. *Dict. Class. Hist. nat.* 10: 8-10.

CARDINAL, A., 1964. Etude sur les Ectocarpacées de la Manche. *Beih. Nova Hedwigia* 15: 5 + 86.

CRIBB, A. B., 1958. Records of marine algae from south-eastern Queensland, 3. *Laurencia* Lamx. *Pap. Dep. Bot. Univ. Qd.* 3 (19): 159-191.

DAWES, C. J., 1969. A study of the ultrastructure of a green alga, *Apjohnia laetevirens* Harvey with emphasis on cell wall structure. *Phycologia* 8: 77-84.

DECAISNE, J., 1842. Essai sur une classification des algues et des polypiers califerès de Lamouroux. *Ann. Sc. Nat.* (*Bot.*), Sér. 2, 17: 297-380.

DEN HARTOG, C., 1970. The sea-grasses of the world. *Verh. K. ned. Akad. Wet.* Sec. 2, pt. 59 (1): 1-275.

DÈRBES, A. and SOLIER, A. J. J., 1851. In Castagne, J. L. M., *Supplément, Catalogue des Plantes qui croissent naturellement aux environs de Marseille.* Aix, 125 pp.

DETONI, G. B., 1900. *Sylloge algarum* . . . Vol. 4 Florideae (Padua), sect. 2, 387-773 + 2.

————, 1903, *Sylloge algarum* . . . Vol. 4 Florideae (Padua), sect. 3, 775-1521.

DUCKER, SOPHIE C., 1965. The structure and reproduction of the green alga *Chlorodesmis bulbosa. Phycologia* 4: 149-162.

————, 1966. An earlier name for the green alga *Chlorodesmis bulbosa. Phycologia* 5: 245-246.

ENDLICHER, S. L., 1843. *Mantissa botanica altera. Sistens generum plantarum*, Suppl. 3. Vienna, 6 + 111 pp.

FARNHAM, W. F. and IRVINE, LINDA M., 1968. Occurrence of unusually large plants of *Grateloupia* in the vicinity of Portsmouth. *Nature, Lond.*, 219: 744-746.

FELDMANN, J., 1957. Sur l'hermaphrodisme du *Bryopsis hypnoides* Lamouroux. *Bull. Soc. phycol. Fr.* 3: 7-8.

FOSLIE, M., and PRINTZ, H., 1929. Contributions to a monograph of the *Lithothamnia*. Trondheim, 60 pp.

GAILLARD, JEANNE, 1968. Etude de *Padina fraseri* (Greville) J. Agardh et comparison avec *Padina tristromatica* Levring. *Nova Hedwigia* 15: 21-27.

GAILLON, B., 1828. Thalassiophytes. *Dict. Sci. nat.* 53: 350-406.

GEPP, A. and GEPP, ETHEL S., 1906. Some marine algae from New South Wales. *J. Bot., Lond.* 44: 249-261.

GREVILLE, R. K., 1827. *Scottish Cryptogamic Flora*, . . . Vol. 5: 4 + Pls. 241-300 + vi.

————, 1830. *Algae britannicae* . . . Edinburgh, 4 + lxxxviii + 218 pp.

HAMEL, G., 1930. Chorophycées des côtes françaises. *Revue algol.* 5: 1-54.

————, 1937. *Phaéophycées de France*. Paris, Fasc. 3: 177-240.

————, 1939. *Phaéophycées de France*. Paris, Fasc. 5: 337-432 + xlvii.

———— and MME P. LEMOINE, 1953. Corallinacées de France et d'Afrique du Nord. *Arch Mus. natn. Hist. nat., Paris*, ser. 7, 1: 17-136.

HARIOT, P., 1889. Algues. In *Mission scientifique du Cap Horn 1882-1883*, Vol. 5: Botanique. Paris, 109 pp.

HARVEY, W. H., 1841. A manual of the British algae . . . . London, lvii + 229 pp.

————, 1844a. *Champia tasmanica;* a new Australian alga. *Lond. J. Bot.* 3: 407.

————, 1844b. Algae of Tasmania. *Lond. J. Bot.* 3: 428-454.

————, 1847. *Nereis australis or algae of the Southern Ocean.* London viii + 124 pp.

————, 1851. *Phycologia britannica* . . . Vol. 3: i-xiv, Pls. 241-360.

————, 1855a. Some account of the marine botany of the colony of Western Australia. *Trans. R. Ir. Acad.* 22: 525-566.

————, 1855b. Short characters of some new genera and species of algae discovered on the coast of the Colony of Victoria, Australia. *Ann. Mag. nat. Hist.* ser. 2, 15: 332-336.

————, 1855c. Algae. In J. D. Hooker, *The botany of the Antarctic Voyage of H.M. Discovery Ships Erebus and Terror in the years 1839-1843* . . . Pt. 2: Flora novae-zelandiae, Vol. 2: Flowerless plants. London, 211-266.

————, 1860. Algae. In J. D. Hooker, *The botany of the Antarctic Voyage of H.M. Discovery Ships Erebus and Terror in the years 1839-1843* . . . Pt. 3: Flora tasmaniae, Vol. 2: Monocotyledones and Acotyledones. London, 282-343.

————, 1862. *Phycologia australica.* Vol. 4. London, viii + Pls. 181-240.

————, 1863. *Phycologia australica.* Vol. 5. London, lxxiii + Pls. 241-300.

———— and BAILEY, J. W., 1851. Descriptions of seventeen new species of algae collected by the United States Exploring Expedition. *Proc. Boston Soc. nat. Hist.* 3: 370-373.

HOMMERSAND, M. H., 1963. The morphology and classification of some Ceramiaceae and Rhodomelaceae. *Univ. Calif. Publs Bot.* 35: 165-366.

HOOKER, J. D. and HARVEY, W. H., 1845. Algae Novae Zelandiae. *Lond. J. Bot.* 4: 521-551.

————, 1847. Algae Tasmanicae. *Lond. J. Bot.* 6: 397-417.

JOHANSEN, H. W., 1969. Morphology and systematics of coralline algae with special reference to *Calliarthron. Univ. Calif. Publs Bot.* 49: 1-98.

————, 1970. The diagnostic value of reproductive organs in some genera of articulated coralline red algae. *Br. phycol. J.* 5: 79-86.

JOLY, A. B., 1965. Flora marinha do litoral norte do estado de São Paulo e regiões circunvizinhas. *Fac. Filos. Ciênc. Let., Univ. São Paulo, Bol. Bot.* 21: 5-393.

KJELLMAN, F. R., 1872. *Bidrag till kännedomen om Skandinaviens Ectocarpeer och Tilopterider.* Akad. Afhand. Stockholm, i + 112 pp.

————, 1900. Om floridé-slägtet *Galaxaura* dess organografi och systematik. *K. Svenska Vetensk-Akad. Handl.* 33: 1-109.

KORNMANN, P., 1953. Der Formenkreis von *Acinetospora crinita* (Carm.) nov. comb. *Helgoländer wiss. Meeresunters* 4: 205-224.

————, 1969. Gesetzmässigkeiten des Wachstums und der Entwicklung von *Chaetomorpha darwinii* (Chlorophyta, Cladophorales). *Helgoländer wiss. Meeresunters.* 19: 335-354.

KUCKUCK, P., 1929. Fragmente einer Monographie der Phaeosporeen. Nach dem Tode des Verfassers herausgegeben von Wilhelm Nienborg. *Wiss. Meeresunt. Helgoland* 17 (Abh. 4): 1-93.

————, 1958. Ectocarpaceen-Studien 5. *Kuckuckia, Feldmannia. Helgoländer wiss. Meeresunters* 6: 171-192.

————, 1961. Ectocarpaceen-Studien 7. *Giffordia. Helgoländer wiss. Meeresunters* 8: 119-152.

KUNTZE, C. E. O., 1898. *Revisio generum plantarum.* .... Pt. 3 (3) Leipzig, vi + 576 pp.

KÜTZING, F. T., 1843. *Phycologia generalis* ... Leipzig, xvi + 144 + xvii-xxxii + 145 — 458 + 1 pp.

————, 1849. *Species algarum.* Leipzig, vi + 922 pp.

————, 1856. *Tabulae phycologicae* ... Vol. 6. Nordhausen, iv + 35 pp.

KYLIN, H., 1924. Studien über die Delesseriaceen. *Acta Univ. lund.*, N.F., Avd. 2, 20 (6): 1-111.

————, 1931. Die Florideenordnung Rhodymeniales. *Acta Univ. lund.*, N.F., Avd. 2, 27 (11), 1-48.

————, 1940. Die Phaeophyceenordnung Chordariales, *Acta Univ. lund.*, N.F. Adv. 2, 36 (9), 67 pp.

————, 1956. *Die Gattungen der Rhodophyceen.* Lund, XV + 673 pp.

LAMOUROUX, J. V. F., 1809. Observations sur la physiologie des algues marines, et description de cinq nouveaux genres de cette famille. *Nouv. Bull. Sc. Soc. Philomath. Paris* 1: 330-333.

————, 1813. Essai sur les genres de la famille des thallassiophytes non articulées *Annls. Mus. Hist. nat., Paris* 20: 21-47, 115-139, 267-293.

————, 1816. *Histoire des polypiers coralligènes flexibles, vulgairement nommés zoophytes.* Caen, lxxxiv + 559 + 1 pp.

LAGERHEIM, G., 1893. *Phaeocystis,* nov. gen., grundadt pa *Tetraspora Poucheti* Har. *Bot. Notiser* [46]: 32-33.

LE JOLIS, A., 1863. *Liste des algues marines de Cherbourg.* Paris, 168 pp.

LEVRING, T., 1953. The marine algae of Australia. 1. Rhodophyta: Goniotrichales, Bangiales, and Nemalionales. *Ark. Bot.* Ser. 2, 2 (6): 457-530.

LINDAUER, V. W., CHAPMAN, V. J., and AIKEN, MIRIAM, 1961. The marine algae of New Zealand. Pt. II. Phaeophyceae. *Nova Hedwigia* 3: 129-350.

LINK, H. F., 1820. Epistola ... de algis aquaticis in genera disponendis. In Nees von Esenbeck, C. G. (Ed.), *Horae Physicae Berolinenses.* Bonn, 1-8.

LINNAEUS, C., 1753. *Species plantarum.* Stockholm.

————, 1758. *Systema naturae* ... 10th ed. Vol. 1. Stockholm, 823 pp.

LUCAS, A. H. S., 1935. The marine algae of Lord Howe Island. *Proc. Linn. Soc. N.S.W.* 60: 194-232.

LUND, S., 1959. The marine algae of East Greenland. I. Taxonomical part *Meddr. Grönland* 156: 1-247.

LYNGBYE, H. C., 1819. *Tentamen Hydrophytologiae Danicae* ... Copenhagen, 248 pp.

MacLENNAN, IONA G., 1956. A brown alga (*Petrospongium rugosum*) new to Victoria. *Proc. R. Soc. Vict.* 69: 1-3.

MARTENS, G. von, 1866. Die Tange. In *Die Preussische Expedition nach Ost-Asien* Berlin. Bot. 1, 152 pp.

MONTAGNE, C., 1846. Phyceae. In M. C. Durieu de Maisonneuve, *Exploration scientifique de l'Algerie* ... *Botanique (Flore d'Algerie), Cryptogamie.* Paris, 197 pp.

NIZAMUDDIN, M., 1964. Studies on *Xiphophora* (Fucales). *Karachi Univ. Stud.* 1: 1-10.

————, 1968. Morphology and anatomy of *Phyllospora, Scytothalia* and *Seirococcus* (Fucales). *Botanica mar.* 11: 81-105.

———— and WOMERSLEY, H. B. S., 1960. Structure and systematic position of the Australian brown alga, *Notheia anomala. Nature, Lond.,* 187: 673-674.

PAPENFUSS, G. F., 1950. Review of the genera of Algae described by Stackhouse. *Hydrobiologia* 2: 181-208.

————, 1960. On the genera of the Ulvales and the status of the Order. *J. Linn. Soc.* (Bot.) 56: 303-318.

————, 1961. The structure and reproduction of *Caloglossa leprieurii. Phycologia* 1: 8-31.

PRICE, I. R. and DUCKER, SOPHIE C., 1966. The life history of the brown alga *Splachnidium rugosum. Phycologia* 5: 261-273.

REINBOLD, T., 1899. Meeresalgen von Investigator Street (Süd-Australien), gesammelt von Miss Nellie Davey (Waltham, Honiton). *Hedwigia* 38: 39-51.

ROSANOFF, S., 1866. Recherches anatomiques sur les Mélobésiées. *Mem. Soc. imp. Sci. nat. Cherbourg* 12: 5-112.

RUSSELL, G., 1966. The genus *Ectocarpus* in Britain. I. The attached forms. *J. mar. biol. Ass. U.K.* 46: 267-294.

SAKAI, YOSHIO, 1964. The species of *Cladophora* from Japan and its vicinity. *Scient. Pap. Inst. algol. Res. Hokkaido Univ.* 5: 1-104.

SAUVAGEAU, C., 1900-1914. *Remarques sur les Sphacélariacées.* Bordeaux, xii + 634 pp. (Pp. 1-348 appeared in *J. Bot., Paris* 14-18).

SCHMITZ, F., 1893. Die Gattung *Lophothalia* J. Ag. *Ber. dt. bot. Ges.* 11: 212-232.

———— and FALKENBERG, P., 1897. Rhodomelaceae, In Engler and Prantl *Die natürlichen Pflanzenfamilien* ... Vol. 1 (2). Leipzig, 421-480.

SETCHELL, W. A. and GARDNER, N. L., 1924. Phycological contributions VII. *Univ. Calif. Publs Bot.* 13: 1-13.

SILVA, P. C., 1950. Generic names of algae proposed for conservation. *Hydrobiologia* 2: 252-280.

———— and WOMERSLEY, H. B. S., 1956. The genus *Codium* (Chlorophyta) in southern Australia. *Aust. J. Bot.* 4: 261-289.

SOLMS-LAUBACH, H. GRAFEN ZU, 1895. Monograph of the Acetabularieae. *Trans. Linn. Soc. Lond.* (Bot.) ser. 2, 5: 1-39.

SOMMERFELD, M. R. and NICHOLS, H. W., 1970. Developmental and cytological studies of *Bangia fuscopurpurea* in culture. *Amer. J. Bot.* 57: 640-648.

SONDER, O. G., 1845. Nova algarum genera et species quas in itinere ad oras occidentales Novae Hollandiae collegit L. Preiss. *Ph. Dr. Bot. Ztg* 3: 49-57.

————, 1846. Algae. In C. Lehmann *Plantae Preissianae*. Hamburg, Vol. 2: 148-195.

————, 1852. Plantae Muellerianae, Algae. *Linnaea* 25: 657-709.

SPARLING, SHIRLEY R., 1957. The structure and reproduction of some members of the Rhodymeniaceae. *Univ. Calif. Publs Bot.* 29: 319-396.

UNGERN-STERNBERG, A. von, 1866. *Versuch einer Systematik der Salicornieen.* Dorpat.

WEBER-van BOSSE, ANNA, 1904. II. Corallineae verae of the Malay Archipelago. In A. Weber-van Bosse and M. Foslie, The Corallinaceae of the Siboga Expedition. *Siboga Exped. Monogr.* 61: 78-110.

————, 1921. Liste des algues du Siboga 2. Rhodophyceae Part 1. Protoflorideae, Nemalionales, Cryptonemiales. *Siboga Exped. Monogr.* 59b: 187-310.

WOLLASTON, ELISE M., 1968. Morphology and taxonomy of southern Australian genera of Crouanieae Schmitz (Rhodophyta, Ceramiaceae). *Aust. J. Bot.* 16: 217-417.

WOMERSLEY, H. B. S., 1946. Studies on the marine algae of southern Australia. Introduction and No. 1. The Genera *Isactis* and *Rivularia* (Myxophyceae). *Trans. R. Soc. S. Aust.* 70: 127-136.

————, 1950, The marine algae of Kangaroo Island. 3. List of species 1. *Trans. R. Soc. S. Aust.* 73: 137-197.

————, 1954a. The species of *Macrosystis* with special reference to those on southern Australian coasts. *Univ. Calif. Publs Bot.* 27: 109-132.

————, 1954b. Australian species of *Sargassum*, subgenus *Phyllotrichia*. *Aust. J. Bot.* 2: 337-354.

————, 1956. A critical survey of the marine algae of southern Australia. 1. Chlorophyta. *Aust. J. Mar. Freshw. Res.* 7: 343-383.

————, 1964. The morphology and taxonomy of *Cystophora* and related genera (Phaeophyta). *Aust. J. Bot.* 12: 53-110.

————, 1965a. The morphology and relationships of *Sonderella* (Rhodophyta, Rhodomelaceae). *Aust. J. Bot.* 13: 435-450.

————, 1965b. The Helminthocladiaceae (Rhodophyta) of southern Australia. *Aust. J. Bot.* 13: 451-487.

————, 1966. Port Phillip Bay Survey 1957-1963. Algae. *Mem. natn. Mus. Vict.* 27: 133-156.

————, 1967. A critical survey of the marine algae of southern Australia 2. Phaeophyta. *Aust. J. Bot.* 15: 189-270.

WYNNE, M. J., 1969. Life history and systematic studies of some Pacific North American Phaeophyceae (Brown Algae). *Univ. Calif. Publs Bot.* 50: 1-88.

ZEH, W., 1912. Neue Arten der Gattung *Liagora*. *Berlin Univ. Bot. Gart. Notizbl.* 5: 268-273.

9

BENTHIC COMMUNITIES

By J. Hope Black

Abstract

The depth, substrate, flora and fauna of the 317 stations worked by the survey are listed and the benthic communities represented are discussed.

Introduction

The benthic fauna of Port Phillip Bay was collected over a period of six years, May 1957 to May 1963. During this period collections were made at 317 stations and all but six of these were within Port Phillip Heads. Six stations were worked within the 10 fm line along the open coast for comparison with the stations within the bay. Where substrate, flora and fauna changed rapidly, such as many areas close to shore, stations were close together. In more uniform areas such as the central silty clay and clay basin within the 10 fm line, stations were more widely spaced.

Such a large (735 sq mi, 1900 sq km) and complex geological area naturally has a variety of communities which can be considered on two levels, viz. (1) the major divisions which are more or less dependent on substrate and depth, and (2) the restricted communities within these major boundaries. Because of the considerable detail involved, it has not been possible to attempt a study of the latter, but the flora and fauna of all stations is listed and the major communities are discussed. Thus the present work is merely a basis on which it is hoped other workers will build by studying in greater detail the communities which are shown to exist.

The methods of collecting by skin divers and dredge were to some extent selective, and the author is sure that grab collecting and divers who have the opportunity to concentrate on small areas would increase the number of species at many of the stations. In spite of this, 22 new species and many new records were collected. Also it was found that some species collected by earlier workers such as the 1888-95 survey of the Royal Society of Victoria have become scarce, and are only taken now in the Heads region. Also because previously there had been no systematic collecting beyond the sublittoral, many species only rarely taken have been found to be dominant in deeper water communities, e.g. *Plesiastrea urvillei, Anadara trapezia,* and *Pecten alba.* It was the information gained from the survey that decided the Fisheries and Wildlife Department to open Port Phillip bay to the scallop fishing industry. All identified species from the survey are listed systematically and numbered. These numbers are used instead of names in the station lists. Where a number is followed by a question mark the identification is made by this author and not the author for the biological group concerned.

The method of tabulation of the stations is to list depth, substrate, flora and fauna followed by remarks if necessary. The boundaries of the major communities, and their affinities in other parts of the world, are discussed.

It is unfortunate that systematic zoologists could not be found to work certain groups in time for this publication, e.g. Porifera and Amphipoda.

Reefs in the bay are limited in extent and occur in less than six fathoms, but most support large and varied plant and animal communities. The most diverse and interesting of these is the artificial reef of the Popes Eye Annulus,

Area 59 (36), built last century in the form of a circle with an opening to the N. It is constructed of basalt, and has a jetty with light on the W. side. The floor is of sand, where the molluscs include the marginellas and *Xenogalea*. This station and its surrounds has such a unique fauna that it should be classified as a marine national reserve to preserve its inhabitants.

Plants

PHANEROGAMS

1. *Zostera muelleri*
2. *Z. tasmanica* (= *Heterozostera*)
3. *Halophila ovalis*
4. *Cymodocea antarctica* (= *Amphibolis*)

ALGAE CHLOROPHYTA

1. *Ulva lactuca*
2. *Chaetomorpha darwinii*
3. *C. indica*
4. *Cladophora bainesii*
5. *C. fascicularis*

6-6B. *Cladophora* sp. (1-3)

7. *Bryopsis plumosa*
8. *Caulerpa brownii*
9. *C. cactoides*
10. *C. flexilis*
11. *C. flexilis* var. *muelleri*
12. *C. geminata*
13. *C. longifolia*
14. *C. longifolia* f. *crispata*
15. *C. obscura*
16. *C. remotifolia*
17. *C. scalpelliformis*
18. *C. simpliciuscula*
19. *C. trifaria*
20. *Codium duthiae*
20A. *C. fragile novaezelandiae*
21. *C. galeatum*
22. *C. harveyi*
23. *C. perrinae*
24. *Acetabularia peniculus*

PHAEOPHYTA

25. *Ectocarpus confervoides*
26. *Feldmannia globifer*
27. *Sphacelaria furcigera*
28. *Halopteris funicularis*
31. *Cladostephus verticillatus*
32. *Cutleria multifida*
33. *Dictyota alternifida*
34. *D. apiculata*
35. *D. dichotoma*
36. *D. furcellata*
37. *Pachydictyon furcellatum*
38. *P. paniculatum*
39. *Dilophus fastigiatus*
40. *Dilophus* sp.
41. *Lobospira biscuspidata*
42. *Dictyopteris muelleri*
43. *Distromium*?
44. *Padina fraseri*
45. *Taonia australasica*
46. *Zonaria turneriana*
47. *Z. sinclairii*
48. *Bellotia eriophorum*
49. *Carpomitra costata*
50. *Colpomenia sinuosa*
51. *Ecklonia radiata*
52. *Macrocystis angustifolia*
53. *Durvillea potatorum*
54. *Xiphophora chondrophylla*
55. *Seirococcus axillaris*
56. *Acrocarpia paniculata*
57. *Caulocystis cephalornithos*
57A. *C. uvifera*
58. *Cystophora congesta*
59. *C. expansa*
60. *C. grevillei*
61. *C. monilifera*
62. *C. moniliformis*
63. *C. retorta*
64. *C. retroflexa*
65. *C. siliquosa*
66. *C. subfarcinata*
67. *C. torulosa*
68. *Myriodesma integrifolia*
69. *Sargassum decipiens*
70. *S. heteromorphum*
71. *S. paradoxum*
72. *S. sonderi*
73. *S. verruculosum*

RHODOPHYTA

74. *Liagora harveyiana*
75. *Delisea elegans*
76. *Gelidium australe*
77. *G. glandulaefolium*
78. *Pterocladia capillacea*
79. *P. lucida*

80. *Dasyphloea insignis*
81. *Cheilosporum elegans*
82. *Corallina cuvieri*
83. *C. officinalis*
84 *Jania fastigiata*
85. *Metagoniolithon stelligerum*
86. *Grateloupia filicina* var. *luxurians*
87. *Polyopes constrictus*
88. *Callophyllis ceratoclada*
89. *C. harveyana*
90. *Gracilaria confervoides*
91. *G. furcellata*
92. *G. secundata*
93. *Melanthalia obtusata*
94. *Plocamium angustum*
95. *P. coccineum*
96. *P. costatum*
97. *P. mertensii*
98. *P. preissianum*
99. *Phacelocarpus labillardieri*
100. *Nizymenia australis*
101. *Solieria mollis*
102. *S. robusta*
103. *Areschougia laurencia*
104. *Erythroclonium muelleri*
105. *Rhabdonia coccinea*
106. *R. nigrescens*
107. *R. verticillata*
108. *Rhodophyllis goodwiniae*
109. *Hypnea episcopalis*
110. *Hypnea* sp.
111. *Ectoclinium dentatum*
112. *Mychodea compressa*
113. *M. foliosa*
114. *M. hamata*
115. *M. membranacea*
116. *Dicranema grevillei*
117. *Stenogramme leptophylla*
118. *Gigartina brachiata*
119. *G. muelleriana*
120. *Rhodoglossum foliiferum*
121. *R. proliferum*
122. *Botryocladia obovata*
123. *Erythrymenia minuta*
124. *Gloiosaccion brownii*
125. *Rhodymenia australis*
126. *Champia affinis* var. *arcuata*
127. *C. obsoleta*
128. *C. tasmanica*
129. *Antithamnion mucronatum*
130. *Ballia callitricha*
131. *B. scoparia*
132. *Ceramium* sp. 1
133. *Ceramium* sp. 2
134. *Ceramium* sp. 3
135. *Griffithsia teges*
136. *Neomonospora griffithsoides*
137. *Spongoclonium conspicuum*
138. *Sypridia opposita*
139. *Wrangelia protensa*
140. *Dasya naccarioides*
141. *D. villosa*
142. *Heterosiphonia gunniana*
143. *H. muelleri*
144. *Acrosorium uncinatum*
145. *Hymenena affinis*
146. *Myriogramme gunniana*
146A. *M.* sp.
147. *Nitophyllum parvifolium*
148. *N.* sp.
149. *Phitymophora imbricata*
150. *Malaconema roeana*
151. *Sarcotrichia dolichocystidea*
152. *Lophurella periclados*
153. *Polysiphonia blandi*
154. *P. cancellata*
155. *Brongniartella australis*
156. *Lopothalia verticillata*
157. *L.* sp.
158. *Dictymenia harveyana*
159. *Jeannerettia pedicellata*
160. *Dasyclonium incisum*
161. *Lenormandia prolifera*
162. *L. smithiae*
163. *Cladurus elatus*
164. *Coeloclonium opuntioides*
165. *Laurencia clavata*
166. *L. elata*
167. *L. filiformis*
168. *L. heteroclada*
169. *L. tasmanica*

Coelenterata

HYDROZOA

1. *Eudendrium capillare*
2. *Tubularia ralphii*
3. *T. larynx*
4. *Pennaria disticha*
5. *Myriothela australis*
6. *Obelia australis*

7. *O. geniculata* f. *subtropica*
8. *Orthopyxis crenata subtropica*
9. *O. caliculata*
10. *Silicularia bilabiata subtropica*
11. *Halecium delicatulum*
12. *Hebella calcarata*
13. *Hincksella corrugata*
14. *Thyroscyphus marginatus*
15. *Stereotheca elongata*
16. *Diphasia subcarinata*
17. *Amphisbetia minima*
18. *A. operculata*
19. *Sertularia unguiculata*
20. *Thuiaria lata*
21. *Dynamena quadridentata*
22. *Symplectoscyphus subdichotomus*
23. *S.* sp.
24. *Sertularella simplex*
25. *S. robusta*
26. *S. undulata*
27. *Plumularia setaceoides*
28. *P. wattsii*
29. *P. procumbens*
30. *Aglaophenia divaricata*
31. *A. decumbens*

31A. *Halicornaria longirostris*

32. *Solanderia fusca*

CORALLIMORPHARIA

1. *Corynactis australis*

ACTINIARIA

2. *Actinia tenebrosa*
3. *Oulactis muscosa*
4. *Anthopleura aureoradiata*
5. *Epiactis australiensis*
6. *E. thomsoni*
7. *Phlyctenactis tuberculosa*
8. *P. australis*
9. *Bunodactis rubrofusca*
10. *Isanemonia australis*
11. *Isophellia stela*
12. *Anthothoe albocincta*
13. *Cricophorus nutrix*

ZOANTHIDEA

14. *Parazoanthus lividum*
15. *Epizoanthus sabulosum*

OCTOCORALLIA

1. *Telesto smithi*
2. *Parerythropodium hicksoni*
3. *P. membranaceum*
4. *Chondronephythya fusca*
5. *Mopsella aurantia*
6. *M. zimmeri*
7. *M. clavigera*
8. *M. klunzingeri*
9. *Mopsea encrinula*
10. *Virgularia* cf. *mirabilis*

SCLERACTINIA

1. *Plesiastrea urvillei*
2. *Homophyllia australis*
3. *Culicia hoffmeisteri*
4. *Monomyces radiatus*

Annelida

POLYCHAETA

1. *Harmothoe spinosa*
2. *Malmgrenia phillipensis*
3. *Paralepidonotus ampulliferus*
4. *Polyeunoa* sp.
5. *Sigalion ovigerum*
6. *Eteone platycephala*
7. *Eulalia* (*Pterocirrus*) *magalhaensis*
8. *Notophyllum splendens*
9. *Phyllodoce duplex*
10. *Nerimyra longicirrata*
11. *Eusyllis brevicirrata*
12. *Syllis kinbergiana*
13. *Trypanosyllis zebra*
14. *Ceratonereis costae*
15. *C. mirabilis*
16. *Nereis cockburnensis*
17. *N.* (*Neanthes*) *caudata*
18. *Perinereis amblyodonta*
19. *P. nutia brevicirris*
20. *Platynereis australis*
21. *Glycera americana*
22. *Goniauda emerita*
23. *Eunice antennata*
24. *E. australis*
25. *E. tentaculata*
26. *E.* (*Palolo*) *siciliensis*
27. *Lysidice ninetta*
28. *Diopatra aciculata*
29. *Onuphis* (*Nothria*) *holobranchiata*
30. *Oenone fulgida*
31. *Lumbrineris latreilli*
32. *Arabella iricolor iricolor*
33. *Dorvillea australiensis*

34. *Cirriformia filigera*
35. *C. tentaculata*
36. *Chaetopterus variopedatus*
37. *Halploscoloplos kerguelensis*
38. *Armandia lanceolata*
39. *Asychis glabra*
40. *Pectinaria antipoda*
41. *Terebellides stroemi*
42. *Polycirrus porcata*
43. *Thelepus setosus*
44. *Amphitrite rubra*
45. *Artacamella dibranchiata*
46. *Axionice harrissoni*
47. *Eupolymnia nebulosa*
48. *Lanice conchilega*
49. *Pista typha*
50. *Branchiomma cingulata*
51. *Sabellastarte indica*
52. *S. longa*
53. *Myxicola infundibulum*
54. *Spirorbis* (*Paralaeospira*) *antarcticus*
55. *S.* (*Paralaeospira*) sp.
56. *Pomatoceros terraenovae*
57. *Salmacina dysteri*
58. *Serpula* sp.
59. *Temporaria polytrema*
60. *Vermiliopsis acanthophora*
61. *V. infundibulum*

SIPUNCULOIDEA

1. *Phascolosoma noduliferum*
2. *Golfingia* sp.
3. *Dendrostomum* sp.

ECHIUROIDEA

1. *Anelassorhynchus adelaidensis*
2. *Bonellia gigas*
3. *B.* sp.
4. *Arhynchite hiscocki*

Crustacea

CIRRIPEDIA

1. *Balanus variegatus cirratus*
2. *Elminius modestus*
3. *E. simplex*

ISOPODA

1. *Paridotea munda*
2. *P. ungulata*
3. *Crabyzos longicaudatus*
4. *Euidotea peronii*
5. *Cirolana woodjonesi*
6. *C. australiense*
7. *Neocirolana obesa*
8. *Serolis tuberculata*
9. *Zuzara venosa*
10. *Cymodoce bidentata*
11. *C. coronata*
12. *C. gaimardii*
13. *C. muldens australis*
14. *C. pubescens*
15. *C. tuberculosa*
16. *Cilicaea curtispina*
17. *C. latreillei*
18. *Paracilicaea hamata*
19. *P. septemdentala*
20. *Cymodopsis crassa*
21. *Dynamenella parva*
22. *D. rubida*
23. *Cerceis acuticaudata*
24. *C. tridentata*
25. *C. trispinosa*
26. *Haswellia anomala*

Crustacea

BRACHYURA

1. *Petalomera lateralis*
2. *P. wilsoni*
3. *Dromidiopsis excavata*
4. *Ebalia* (*Phlyxia*) *intermedia*
5. *Philyra larvis*
6. *P. undecimspinosa*
7. *Halicarcinus ovatus*
8. *H. rostratus*
9. *Paratymolus latipes*
10. *Naxia deflexifrons*
11. *N. aurita*
12. *N. tumida*
13. *Notomithrax minor*
14. *Leptomithrax gaimardii*
15. *Carcinus maenus*
16. *Nectocarcinus integrifrons*
17. *Ovalipes australiensis*
18. *Actaea peroni*
19. *Pilumnus acer*
20. *P. etheridgei*
21. *P. monilifer*
22. *P. tomentosus*
23. *Heteropilumnus fimbriatus*
24. *Pilumnopeus serratifrons*
25. *Litocheira bispinosa*

26. *Pinnotheres pisum*
27. *Leptograpsus variegatus*
28. *Cyclograpsus audomnii*
29. *Paragrapsus quadridentatus*
30. *P. gaimardii*
31. *Myctryis platycheles*

Mollusca

Amphineura

1. *Terenochiton liratus*
2. *Subterenochiton gabrieli*
3. *Poneroplax albida*
4. *P. costata*
5. *Kopionella matthewsi*
6. *Craspedoplax variabilis*
7. *Acanthochiton bednalli*
8. *A. graniostratus*
9. *Meturoplax retrojecta*
10. *Cryptoplax iredalei*
11. *C. striata*
12. *Ischnochiton elongatus*
13. *I. falcatus*
14. *I. lineolatus*
15. *I. variegatus*
16. *Ischnoradsia evanida*

16A. *Aulacochiton cimolia*

17. *Heterozona cariosa*
18. *H. fruticosa*
19. *Rhyssoplax exoptanda*
20. *R. tricostalis*

Gastropoda

1. *Notohaliotis ruber*
2. *Marinauris emmae*
3. *Schismotis laevigata*
4. *Notomella candida*
5. *Montfortula rugosa*
6. *Amblychilepas javanicensis*
7. *A. omicron*
8. *A. nigrita*
9. *A. oblonga*
10. *Cosmetalepas concatenatus*
11. *Eligidion audax*
12. *Cellana tramoserica*
13. *Patelloida alticostata*
14. *Chiazacmea flammae*
15. *Actinoleuca calamus*
16. *Notoacmea granosa*
17. *N. mayi*
18. *N. scabrilirata*
19. *Herpetopoma aspersa*
20. *Grantia imbricata*
21. *Calliostoma (Fautor) allporti*
22. *Cantharidella tiberiana*
23. *Cantharides pulcherrimus*
24. *C. ramburi*
25. *Phasianotrochus apicinus*
26. *P. eximius*
27. *P. irisodontes*
28. *P. rutilus*
29. *Austrocochlea adelaidea*
30. *A. constricta*
31. *A. odontis*
32. *Clanculus aloysii*
33. *C. limbatus*
34. *C. plebejus*
35. *Ethminiola tasmanica*
36. *Stomatella impertusa*
37. *Subninella undulata*
38. *Micrastraea aurea*
39. *Phasianella australis*
40. *P. ventricosa*
41. *Melanerita melanotragus*
42. *Melarapha praetermissa*
43. *M. unifasciata*
44. *Bembicium auratum*
45. *B. melanostomum*
46. *B. nanum*
47. *Assiminea brazieri*
48. *A. tasmanica*
49. *Serpulorbis sipho*
50. *Velacumantus australis*
51. *Zeacumantus diemenensis*
52. *Diala lauta*
53. *D. monile*
54. *D. pagodula*
55. *D. pulchra*
56. *Cacozeliana granaria*
57. *Eubittium lawleyanum*
58. *Hypotrochus monachus*
59. *Ataxacerithium serotinum*
60. *Notosinister maculosa*
61. *Cingulina spira*
62. *Hipponyx conicus*
63. *Antisabia foliacea*
64. *Capulus violacea*
65. *Sigapatella calpytraeformis*
66. *Zeacrypta immersa*
67. *Conuber conicum*
68. *Glossaulax aulacoglossa*

69. *Sigaretotrema umbilicata*
70. *Ectosinum zonale*
71. *Lamellaria* sp.
72. *Notocypraea angustata*
73. *N. comptoni*
74. *Xenogalea pyrum*
75. *Cymatiella lesueuri*
76. *C. verrucosa*
77. *Cabastana spengleri*
78. *C. waterhousei*
79. *Pterynotus triformis*
80. *Bedeva paivae*
81. *Lepsiella vinosa*
82. *Dicathais textilosa*
83. *Dentimitrella austrina*
84. *D. franklinensis*
85. *D. lincolnensis*
86. *D. menkeana*
87. *D. nubeculata*
88. *D. pulla*
89. *D. semiconvexa*
90. *Macrozafra angasi*
91. *Austrosipho grandis*
92. *Cominalla eburnea*
93. *C. lineolata*
94. *Parcanassa buchardi*
95. *P. pauperata*
96. *Tavaniotha optata*
97. *Niotha pyrrhus*
98. *Pleuroploca australasia*
99. *Microcolus dunkeri*
100. *Alocospira marginata*
101. *Austromitra tasmanica*
102. *Mitra australis*
103. *Eumitra glabra*
104. *Amorena undulata*
105. *Cryptospira pygmaeoides*
106. *Austroginella johnstoni*
107. *Mitraguraleus mitralis*
108. *Floroconus anemone*
109. *Salinator fragilis*
110. *Siphonaria diemenensis*

Opisthobranchia

There were 88 species of Opisthobranchia recorded for Port Phillip by Burn 1966, but most of these are seasonal in occurrence and unimportant when considering permanent ecological communities; hence they have not been listed here.

1. *Bulla botanica*
2. *Haminoea brevis*
3. *H. tenera*
4. *Philine angasi*
5. *Doridium queritor*
6. *D. cyaneum*
7. *Aplysia parvula*
8. *A. sydneyensis*
9. *Pleurobranchaea maculosa*
10. *Ceratosoma brevicaudatum*
11. *Austrodoris pecularis*
12. *Alloiodoris nivosus*
13. *Doriopsilla aurea*
14. *D. carneola*
15. *D. staminea*

Bivalvia

1. *Leionucula obliqua*
2. *Anadara trapezia*
3. *Barbatia pistachia*
4. *B. squamosa*
5. *Modiolus cottoni*
6. *M. inconstans*
7. *Brachidontes rostratus*
8. *Lanistina ulmus*
9. *Mytilus planulatus*
10. *Electroma georgiana*
11. *Propeamussim thetidis*

11A. *Pecten alba*

12. *Chlamys asperrimus*
13. *Ostrea angasi*
14. *Venericardia bimaculata*
15. *Fulvia tenuicostata*
16. *Phacosoma coerulea*
17. *P. circinaria*
18. *Notocallista kingii*
19. *Chioneryx cardioides*
20. *Tawera gallinula*
21. *Callanaitis disjecta*
22. *Eumarcia fumigata*
23. *Katelysia rhytiphora*
24. *K. scalarina*
25. *Pullastra fabagella*
26. *P. galactites*
27. *Donacilla nitida*
28. *Notospisula cretacea*
29. *N. trigonella*
30. *Electromactra antecedens*
31. *Soletellina biradiata*
32. *S. donacioides*

33. *Theora fragilis*
34. *Pseudarcopagia victoriae*
35. *Homalina deltoidalis*
36. *H. mariae*
37. *Hiatella australis*
38. *Gastrochaena tasmanica*
39. *Pholas australasiae*
40. *Myadora brevis*
41. *Cleidothearus albidus*
42. *Offadesma angasi*
43. *Laternula creccina*

CEPHALOPODA

1. *Amplisepia apama*
2. *Euprymna tamanica*
3. *Idiosepius notoides*
4. *Nototodarus sloanii gouldii*
5. *Sepioteuthis australis*
6. *Loligo* sp.
7. *Octopus australis*
8. *O. flindersi*
9. *O. pallidus*
10. *O. supersiliosus*
11. *Hapalochlaena maculosa*
12. *Argonauta nodosa*

BRACHIOPODA

1. *Megerlena lamarckiana*

BRYOZOA

1. *Elzerina blainvillii*
2. *Bowerbankia* sp.
3. *Amathia australis*
4. *A. biseriata*
5. *A. inarmata*
6. *A. tortuosa*
7. *A.* sp.
8. *Crisia acropora*
9. *C. edwardsiana*
10. *C. tenuis*
11. *C. geniculata*
12. *C.* sp.
13. *Berenicea sarniensis*
14. *Stomatopora geminata*
15. *Idmidronea australis*
16. *Hornera foliacea*
17. *H.* sp.
18. *Lichenopora* sp.
19. *Aetea anguina*
20. *A. sica*
21. *A.* sp.
22. *Scruparia ambigua*
23. *Membranipora membranacea*
24. *M. perfragilis*
25. *M. papulifera*
26. *Conopeum reticulum*
27. *Spiralaria denticulta*
28. *Bugularia dissimilis*
29. *Pyrulella pyrula*
30. *Hiantopora ferox*
31. *Arachnopusia monoceros*
32. *Caleschara denticulata*
33. *Steganoporella magnilabris*
34. *Thairopora cincta*
35. *T. mamillaris*
36. *T.* sp.
37. *Cellaria punctata*
38. *C. hirsuta*
39. *C. tenuirostris*
40. *Didymozoum simplex*
41. *Beania crotali*
42. *B. magellanica*
43. *B. spinigera*
44. *Dimetopia spicata*
45. *Cornucopina grandis*
46. *C. tuba*
47. *Bugula dentata*
48. *B. neritina*
49. *B.* sp.
50. *Scrupocellaria cyclostoma*
51. *S. diadema*
52. *S. ornithorhyncus*
53. *S. scrupea*
54. *S. scruposa*
55. *Amastigia rudis*
56. *Bugulopsis cuspidata*
57. *Caberea darwinii*
58. *C. glabra*
59. *C. grandis*
60. *C.* sp.
61. *Canda arachnoides*
62. *C. tenuis*
63. *Menipea crystallina*
64. *M.* sp.
65. *Celleporella hyalina*
66. *Euthyroides episcopalis*
67. *Schizoporella biturrita*
68. *S.* sp.
69. *Microporella ciliata*
70. *Fenestrulina malusii*

71. *F.* sp.
72. *Mucropetraliella ellerii*
73. *M. serrata*
74. *M. watersi*
75. *Mucropetraliella* sp.
76. *Parasmittina trispinosa*
77. *P. macphersonae*
78. *Smittina* sp.
79. *Margaretta hirsuta*
80. *Retepora avicularis*
81. *Retepora* sp.
82. *Rhynchozoon tubulosum*
83. *Schizoretepora tessellata*
84. *Triphyllozoon monilifera*
85. *Adeona grisea*
86. *A.* sp.
87. *Adeonella cellulosa*
88. *A. gracilis*
89. *Adeonellopsis mucronata*
90. *A.* sp.
91. *Celleporaria foliata*
92. *C. verrucosa*
93. *C. albirostris*
94. *C. mamillata*
95. *C. prolifera*
96. *C.* sp.
97. *Celleporina costazii*
98. *Vittaticella elegans*
99. *V. buskii*
100. *V. perforata*
101. *V.* sp.
102. *Costaticella hastata*
103. *Scuticella lorica*
104. *S. margaritacea*
105. *S. plagiostoma*
106. *S. ventricosa*
107. *Cornuticella cornuta*
108. *Pterocella alata*
109. *Claviporella aurita*
110. *C. geminata*
111. *Calpdium ponderosum*
112. *Calwellia bicornis*
113. *C. gracilis*

ECHINODERMATA

CRINOIDEA

1. *Comanthus trichoptera*
2. *Aporometra wilsoni*
3. *Euantedon paucicirra*
4. *Antenoid* sp.
5. *A. incommoda*
6. *A. loveni*

ASTEROIDEA

1. *Tosia australis*
2. *T. magnifica*
3. *Pentagonaster duebeni*
4. *Nectria macrobrachia*
5. *N. ocellata*
6. *N. multispina*
7. *Petricia vernicina*
8. *Austrofromia polypora*
9. *Patiriella calcar*
10. *P. gunni*
10A. *P. brevispina*
11. *Paranepanthia grandis*
12. *Nepanthia hadracantha*
13. *Plectaster decanus*
14. *Coscinasterias calamaria*
15. *Allostichaster polyplax*
16. *Uniophora granifera*

OPHIUROIDEA

1. *Ophiomyxa australis*
2. *Ophiacantha alternata*
3. *Ophiactes resiliens*
4. *Amphipholus squamata*
5. *Amphiura constricta*
6. *A. poelica*
7. *A. elandiformis*
8. *A. (Ophiopeltis) parviscutata*
9. *Ophiocentrus pilosus*
10. *Ophiothrix caesipitosa*
11. *O.* sp.
12. *Ophiocoma canaliculata*
13. *Ophionereis schayeri*
14. *Ophiarachnella ramsayi*
15. *Ophiura kinbergi*

ECHINOIDEA

1. *Goniocidaris tubaria* f. *impressa*
2. *Heliocidaris erythrogramma*
3. *Amblypneustes ovum*
3A. *Pachycentrotus australiae*
4. *Echinocardium cordatum*

HOLOTHUROIDEA

1. *Stichopus mollis*
2. *Pentacta australis*
3. *Steroderma* sp.

4. *Staurothyone inconspicua*
5. *Thyone nigra*
6. *Cucumella mutans*
7. *Paracaudina australis*
8. *Leptosynapta dolabrifera*
9. *Trochdota allani*

ASCIDIACEA

ENTEROGONA

1. *Aplidium phortax*
2. *Synoicum papilliferum*
3. *S. arenaceum*
4. *Ritterella asymmetrica*
5. *Clavelina baudinensis*
6. *Podoclavella cylindrica*
7. *Polycitor gigantus*
8. *Sycozoa tenuicaulis*
9. *S. cerebriformis*
10. *Distaplia viridis*
11. *D. stylifera*
12. *Cystodites dellechiajei*
13. *Ciona intestinalis*
14. *Corella eumyota*
15. *Perophora hutchisoni*
16. *Ascidia sydneiensis*
17. *A. gemmata*
18. *Ascidiella aspersa*

PLEUROGONA

1. *Botryllus gracilis*
2. *B. stewartensis*
3. *Botrylloides magnicoecus*
4. *Symplegma viride*
5. *Amphicarpa diptycha*
6. *Polyandrocarpa lapidosa*
7. *Oculinaria australis*
9. *Polycarpa pedunculata*
10. *Styela etheridgii*
11. *S. plicata*
12. *Asterocarpa cerea*
13. *Pyura irregularis*
14. *P. pachydermatina*
15. *P. praeputialis*
16. *P. fissa*
17. *Microsmus spiniferus*
18. *M. australis*
19. *Herdmania momus*
20. *Molgula sabulosa*
21. *M. janis*

Benthic Stations

AREA 2 (201)

Depth. 3·5 fm
Substrate. Dark grey to blackish clay
Annelida. Polychaeta 21, 28
Mollusca. Bivalvia 29
Ascidiacea. Pleurogona 15

REMARKS: This station E. of the shipping channel is situated on the clay of the Yarra R. mouth and has the barrenness expected of a scoured channel.

AREA 3 (202)

Depth. 2·5 fm
Substrate. Sand
Algae. Rhodophyta 134
Crustacea. Isopoda 12, Brachyura 6-7, 13.
Mollusca. Gastropoda 80, 96. Bavalvia 9-10, 19-20, 22-23, 29.

AREA 3 (203)

Depth. 2·5 fm
Substrate. Ironstone reef outcropping from sand. The reef was covered with coral almost to the exclusion of other growth.
Coelenterata. Scleractinea 1
Crustacea. Isopoda 12, Brachyura 4, 16
Mollusca. Gastropoda 68, 98. Bivalvia 13, 20, 22-23
Ascidiacea. Pleurogona 15.

AREA 5 (51)

Depth. 4 fm
Substrate. Sand
Algae. Phaeophyta 73
Crustacea. Brachyura 7, 13, 16, 21-22, 25
Mollusca. Bivalvia 13
Bryozoa. 72, 76
Echinodermata. Asteroidea 10A, Holothuroidea 1
Ascidiacea. Pleurogona 15.

AREA 5 (52)

Depth. 3-3·5 fm
Substrate. Sand
Algae. Phaeophyta 51
Mollusca. Gastropoda 32, 24, 80, Bivalvia 9, 11A, 13
Bryozoa. 72, 76
Echinodermata. Asteroidea 15, Holothuroidea, 2.

AREA 5 (53)
Depth. 2·5 fm
Substrate. Sand, with some broken shaley reef
Algae. Phaeophyta 51
Annelida Polychaeta. 1, 20, 44
Mollusca. Amphineura 12, 18, Gastropoda 15, 32, 34, Opisthobranchia 10, Bivalvia 9, 13, 31
Bryozoa. 72, 76
Echinodermata. Asteroidea 7.

AREA 5 (54)
Depth. 2-2·5 fm
Substrate. Sand and broken reef
Algae. Rhodophyta 83, 102
Coelenterata. Hydrozoa 10, 17
Crustacea. Isopoda 15, 17
Mollusca. Amphineura 12, 18, Gastropoda 28, 32, 34, Bivalvia 9, 13, 38
Bryozoa. 72, 76.

AREA 5 (55)
Depth. 2·5 fm
Substrate. Broken reef and sand
Mollusca. Bivalvia 9, 13
Bryozoa. 72, 76.

AREA 5 (56)
Depth. 3·5 fm
Substrate. Reef
Algae. Chlorophyta 14, 16, Rhodophyta 120-121
Coelenterata. Scleractinia 1
Annelida. Polychaeta 26
Mollusca, Gastropoda 15, Bivalvia 9, 13, 23
Bryozoa. 72, 76.

AREA 5 (57)
Depth. 2 fm
Substrate. Sand
Algae. Chlorophyta 14, 16
Mollusca. Bivalvia 9, 13, 26
Bryozoa. 54, 68-69, 72, 74, 76, 79, 90-91
Ascidiacea. Enterogona 17, Pleurogona 10, 18.

AREA 5 (58)
Depth. 2 fm
Substrate. Shelly sand
Algae. Rhodophyta 102
Coelenterata. Actinaria 3
Crustacea. Brachyura 19, 26
Mollusca. Gastropoda 96, Bivalvia 9, 13, 26
Bryozoa. 72, 76.

REMARKS: Area 5 (51-58) is a uniform habitat with a sand bottom through which outcrops broken basalt reef. The sand has a limited fauna with *Mytilus planulatus* and *Ostrea angasi* dominant, and *Pecten alba* in the deeper water.

AREA 5 (165)
Depth. 6 fm
Substrate. Silty sand
Algae. Rhodophyta 122
Crustacea. Brachyura 7, 26
Mollusca. Bivalvia 9
Ascidiacea. Pleurogona 11, 18.

AREA 5 (166)
Depth. 6 fm
Substrate. Silty sand
Algae. Chlorophyta 6, 14, Phaeophyta 32
Crustacea. Brachyura 7, 13, 22, 26
Mollusca. Gastropoda 80, Bivalvia 9, 11A, 13
Echinodermata. Holothuroidea 1
Ascidiacea. Pleurogona 11, 13, 15, 18.

AREA 5 (167)
Depth. 7 fm
Substrate. Silty sand
Phanerogams. 1
Algae. Rhodophyta 121
Crustacea. Brachyura 7
Mollusca. Bivalvia 9, 13, 24
Ascidiacea. Pleurogona 15, 18.

AREA 5 (168)
Depth. 1·5 fm
Substrate. Sand and some shale
Phanerogams. 1
Algae. Chlorophyta 14
Crustacea. Isopoda 5, Brachyura 7, 13, 16, 26
Mollusca. Gastropoda 92, Bivalvia 9-10, 13, 23
Echinodermata. Asteroidea 1-2
Ascidiacea. Pleurogona 15, 18.

AREA 5 (169)
Algae. Chlorophyta 14
Annelida. Polychaeta. 1, 3, 6, 20, 34, 44, 47
Crustacea. Brachyura 7, 26 in Bivalvia 9
Mollusca. Bivalvia 9, 10, 13, Opisthobranchia 4
Echinodermata. Echinoidea 3.

REMARKS: The series of stations Area 5 (165-9) are typical of the *Caulerpa* beds of the NW. section of the bay. Stations 167-168 are on small isolated patches of *Zostera*.

AREA 6 (63)
Depth. 6-6·5 fm
Substrate. Silty sand
Algae. Rhodophyta 139
Crustacea. Brachyura 6
Mollusca. Gastropoda 98, Bivalvia 9, 11A, 13
Echinodermata. Holothuroidea 1
Ascidiacea. Pleurogona 17, on *Pecten alba.*

AREA 6 (64)
Depth. 6 fm
Substrate. Silty sand
Algae. Rhodophyta 136
Crustacea. Brachyura 6, 26
Mollusca. Bivalvia 9, 11A, 13, Opisthobranchiata 4
Echinodermata. Holothuroidea 1
Ascidiacea. Pleurogona 17.

AREA 6 (65)
Depth. 5 fm
Substrate. Sand with reef outcropping
Coelenterata. Actinaria 3
Annelida. Polychaeta 34
Crustacea. Isopoda 13, 17, Brachyura 6
Mollusca. Amphineura 20, Gastropoda 15, 51, 66, Opisthobranchiata 4, Bivalvia 3, 9
Bryozoa. 91-92, 94-95
Echinodermata. Asteroidea 4, 7, Echinoidea 2, 4, Holothuroidea 2
Ascidiacea. Pleurogona 9-10.

AREA 6 (66)
Depth. 5 fm
Substrate. Silty sand.
Algae. Chlorophyta 8
Crustacea. Brachyura 4-5, 7, 13, 22
Mollusca. Gastropoda 51, 66, Bivalvia 9
Ascidiacea. Enterogona 17.

AREA 6 (67)
Depth. 5 fm
Substrate. Silty sand
Algae. Chlorophyta 8, Phaeophyta 51, Rhodophyta 136
Crustacea. Brachyura 4-5, 25
Mollusca. Bivalvia 9, 13, Opisthobranchiata 4
Ascidiacea. Enterogona 8.

AREA 6 (118)
Depth. 0·5-1 fm
Substrate. Sandy silt with outcropping reef
Phanerogams. 1
Algae. Cholorophyta 1, 18, 20A, Phaeophyta 71, Rhodophyta 83, 86, 105, 118, 120, 135-136, 148, 152
Annelida. Polychaeta 44, 47
Crustacea. Isopoda 1, Brachyura 5, 7, 13, 29
Mollusca. Gastropoda 12, 37-38, 70, 92, 95, 97, Bivalvia 9, 13, 23, 26, 34
Echinodermata. Asteroidea 9, Ophiuroidea 4
Ascidiacea. Pleuogona 2, 18.

REMARKS: This station was the wreck of the Albert William Barge and because of the shallow water a number of species was found in the lower eulittoral and sub-littoral.

AREA 6 (136)
Depth. 2·2 fm
Substrate. Silty sand
Crustacea. Brachyura 7.

AREA 6 (137)
Depth. 2·5 fm
Substrate. Coarse sand with outcropping reef
Algae. Chlorophyta 8, Rhodophyta 125, 144, 167
Annelida. Polychaeta 1
Crustacea. Brachyura 13, 21, 25
Mollusca. Amphineura 12, 20, Gastropoda 1, 32, 34, 38, 65, 66, 80, 89, 98, Bivalvia 3, 9, 10, 13
Bryozoa. 70, 75
Echinodermata. Asteroidea 1, 7, 14, 15, Ophiuroidea 2, 4, Echinoidea 2, Holothuroidea 2
Ascidiacea. Enterogona 5, 17, Pleurogona 4, 17-18.

REMARKS: This is the area surrounding the wreckage of the *Kakariki.*

AREA 6 (199)
Depth. 8·5 fm
Substrate. Silty clay.

REMARKS: Visibility was poor and the bottom appeared to be barren.

AREA 6 (200)
Depth. 8 fm
Substrate. Silty clay
Annelida. Polychaeta 35.

AREA 7 (123)
Depth. 3·5 fm
Substrate. Sand
Coelenterata. Actinaria 11

Annelida. Polychaeta 1, 14, 44, 50
Crustacea. Brachyura 13, 16, 22-23, 25
Mollusca. Bivalvia 9, 13
Bryozoa. 53-54
Echinodermata. Asteroidea 1, Ophiuroidea 5, Echinoidea 4, Holothuroidea 1, 6
Ascidiacea. Enterogona 8, 17, Pleurogona 9, 18.

REMARKS: There were numbers of stones up to 10 × 5 cm which served as an attachment for mussels and ascidians.

AREA 7 (204)

Depth. 2·5 fm
Substrate. Sand with reef outcropping
Annelida. Polychaeta 1, 34
Crustacea. Isopoda 12, Brachyura 13
Mollusca. Bivalvia 9-10.

AREA 7 (205)

Depth 2·5 fm
Substrate. Sand with reef outcropping
Algae. Rhodophyta, 132
Crustacea. Isopoda 12, Brachyura 6
Ascidiacea. Pleurogona 18.

REMARK: Stations 204-5 are both situated on a reef off Point Ormond.

AREA 7 (206)

Depth. 4 fm
Substrate. Sand with some pebbles
Crustacea. Isopoda 12, Brachyura 7
Mollusca. Gastropoda 15, 32, 34, 65, 80, 92, 96. Bivalvia 9, 18-19, 22, 25, 29.

AREA 7 (207)

Depth 2·5 fm
Substrate. Sand
Annelida. Polychaeta 14, 35, 44
Crustacea. Isopoda 12, Brachyura 13
Mollusca. Bivalvia 11A
Echinodermata. Ophiuroidea 7.

AREA 7 (208)

Depth. 5·5 fm
Substrate. Sand
Annelida. Polychaeta 47
Crustacea. Isopoda 12, Brachyura 4, 7, 13, 26
Mollusca. Gastropoda 96, Bivalvia 9-10, 19, 22, Opisthobranchia 4
Echinodermata. Echinoidea 4, Holothuroidea 1.

AREA 9 (62)

Depth. 2·f fm
Substrate. Medium to coarse sand and shell fragments
Phanerogams. 3
Algae. Chlorophyta 8, 12, 14, 16
Mollusca. Gastropoda 97, Bivalvia 9, 15
Ascidiacea. Enterogona 8, Pleurogona 9.

AREA 9 (84)

Depth. Sublittoral
Substrate. Sand
Phanerogam. 1
Coelenterata. Actinaria 3-4
Annelida. Polychaeta 19
Crustacea. Brachyura 7, 15, 30
Mollusca. Gastropoda 95, Bivalvia 9-10, 23, 25, 28, 30, 35, 43
Ascidiacea. Pleurogona 20.

REMARKS: The species (particularly the molluscs) recorded at this station, are typical of shallow very sheltered water fauna of the bay.

AREA 9 (178)

Depth. 1·5 fm
Substrate. Fine sand with skeletal matter
Algae. Chlorophyta 8, 12, 16, 18, Rhodophyta 102, 120, 122, 154
Annelida. Polychaeta 1, 11, 20, 32, 35, 47, 50
Crustacea. Brachyura 4, 7, 13, 16, 25
Mollusca. Gastropoda 32, 34, 56, 79, Bivalvia 9-10, 25, Opisthobranchia 4
Echinodermata. Asteroidea 15
Ascidiacea. Pleurogona 15.

AREA 9 (179)

Depth. 3·5 fm
Substrate. Coarse sand with shells and pebbles
Coelenterata. Hydrozoa 28
Mollusca. Gastropoda 32, 34, 56, 79, Bivalvia 9-10, 23, 25.

REMARKS: In Table A (Mem. Nat. Mus. 27) this position is recorded as Area 19 but in Chart 2 it is shown in the extreme SE. corner of Area 9. This is of little importance as both positions fall in the extensive *Caulerpa* beds of the NW. coast of Port Phillip Bay (Chart 3, Mem. 27).

AREA 9 (180)

Depth. 3 fm
Substrate. Sand
Crustacea. Brachyura 4, 7, 13, 16, 25
Mollusca. Gastropoda 32, 34, 56, 79, Bivalvia 9-10, 25
Ascidiacea. Pleurogona 13, 15.

AREA 10 (11)

Depth. 8·5 fm
Substrate. Silty sand
Coelenterata. Hydrozoa 3
Mollusca. Gatsropoda 15, 58, 80, 88, Bivalvia 3, 9, 11A, 13, 15
Echinodermata. Asteroidea 1, Holothuroidea 2
Ascidiacea. Pleurogona 11, 15.

AREA 10 (12)

Depth. 7 fm
Substrate. Silty sand
Coelenterata. Corallimorparia 1
Mollusca. Bivalvia 3, 11A, 13, 21
Ascidiacea. Enterogona 8, 11, Pleurogona 10, 15.

AREA 10 (13)

Depth. 6·5 fm
Substrate. Silty sand
Annelida. Polychaeta 44, 47
Crustacea. Brachyura 3, 7, 22, 25
Mollusca. Gastropoda 32, Bivalvia 9-10, 11A
Ascidiacea. Pleurogona 10, 15.

AREA 10 (14)

Depth. 7·5 fm
Substrate. Silty sand
Phanerogams. 3
Annelida. Polychaeta 44, 47
Crustacea. Brachyura 3, 16, 21, 25
Mollusca. Gastropoda 28, 32, 56, 58, 65, Bivalvia 9-10, 11A, 12
Echinodermata. Echinoidea 4, Holothuroidea 1
Ascidiacea. Pleurogona 10, 15.

AREA 10 (15)

Depth. 4 fm
Substrate. Sand
Phanerogam. 1
Algae. Chlorophyta 8, 14, 16, Phaetophyta 57, Rhodophyta 122, 157
Annelida. Polychaeta 47
Crustacea. Brachyura 3, 25
Mollusca. Gastropoda 28, 32, 34, 58, Bivalvia 9, 13
Ascidiacea. Pleurogona 15, 20.

AREA 10 (103)

Depth. 2·25 fm
Subtrate. Clayey sand
Algae. Chlorophyta 6, Phaeophyta 52, Rhodophyta 105, 122, 152, 167
Coelenterata. Hydrozoa 1, 8, 10, 21, 25
Annelida. Polychaeta 1, 52
Crustacea. Isopoda 2, 17, Brachyura 13, 29
Mollusca. Bivalvia 9, 13
Bryozoa. 2, 25, 48, 64-65, 90-91
Echinodermata. Asteroidea 1, 9, 15-16, Echinoidea 2, Holothuroidea 1.

AREA 10 (104)

Depth. 2·5 fm
Substrate. Sand-clay-silt
Algae. Rhodophyta 105, 122
Annelida. 1
Crustacea. Isopoda 2, 17
Mollusca. Bivalvia 9, 13
Bryozoa. 2, 25, 48, 64-65, 72, 91.

AREA 10 (105)

Depth. 2·5 fm
Substrate. Sand-silt-clay
Algae. Chlorophyta 8, Rhodophyta 122
Annelida. Polychaeta 1
Crustacea. Isopoda 2, 17
Bryozoa. 2, 25, 48, 64-65, 90-91.

AREA 10 (106)

Depth.
Substrate. Sand-silt-clay
Algae. Rhodophyta 122
Annelida. Polychaeta 1
Crustacea. Isopoda 2, 17
Mollusca. Gastropoda, 92, 95, Bivalvia 9, 22-23, 27, 29, 35.

REMARKS: Stations 103-6 are situated in the vicinity of Point Cook Pier and together illustrate the community of the area.

AREA 10 (193)

Depth. 6 fm
Substrate. Junction of sand and silty sand
Bryozoa. 6-7
Echinodermata. Asteroidea 2, Holothuroidea 1.

REMARKS. This station is in the transition zone from the *Caulerpa* to the more barren silty sand with its restricted fauna.

AREA 10 (194)
Depth. 8 fm
Substrate. Silty sand
Echinodermata. Echinoidea 4, Holothuroidea 1.

REMARKS. This dredge haul, like 193, crossed the transition zone.

AREA 11 (125)
Depth. 8·5 fm
Substrate. Silty sand
Crustacea. Brachyura 13
Mollusca. Bivalvia 9, 11A, 13, 15, 21
Echinodermata. Holothuroidea 1-2, 6
Ascidiacea. 15

REMARKS: This station has a fauna typical of the communities living on the silty sand at depths from 7-10 fm. The dominant marker species are *Mytilus planulatus, Pecten alba, Ostrea angasi, Strichopus mollis* and *Pyura praeputialis.*

AREA 11 (190)
Depth. 5·5 fm
Substrate. Sand and shell fragments
Algae. Chlorophyta 12, 16, 18, Rhodophyta 122
Annelida. Polychaeta 1, 32, 34, 50
Crustacea. Isopoda 11, Brachyura 7-8, 13, 16, 21-22, 25
Mollusca. Gastropoda 15, 32, 34, 58, 65, Opisthobranchia 4, Bivalvia 8, 10, 13, 15, 19
Bryozoa. 69
Echinodermata. Echinoidea 4
Ascidiacea. Pleurogona 18.

REMARKS: This station is on the transition zone between the *Caulerpa* dominated sand fauna and the holothurian-*Pyura* fauna of the silty sand.

AREA 11 (191)
Depth. 5·5 fm
Substrate. Sand
Algae. Rhodophyta 101, 122
Crustacea. Brachyura 16, 25
Echinodermata. Asteroidea 15, Ophiuroidea 5, 13
Ascidiacea. Pleurogona 15.

AREA 11 (192)
Depth. 5 fm
Substrate. Silty sand
Algae. Chlorophyta 12, 16, 18
Crustacea. Isopoda 11
Ascidiacea. Pleurogona 15.

AREA 11 (195)
Depth. 10·5 fm
Substrate. Silty clay
Annelida. Polychaeta 1
Crustacea. Brachyura 4.

AREA 11 (212)
Depth. 8 fm
Substrate. Sandy silt
Annelida. Polychaeta 14, 21, 36, 44, 47, 50, 53
Bryozoa. 6, 53-54, 77
Ascidiacea. Pleurogona 10.

AREA 12 (110)
Depth. 8·5 fm
Substrate. Sand-silt-clay
Algae. Rhodophyta 156
Coelenterata. Hydrozoa 3, 6
Mollusca. Bivalvia 9
Echinodermata. Holothuroidea 1-2.

AREA 12 (111)
Depth. 9 fm
Substrate. Sand-silt-clay
Coelenterata. Hydrozoa 3, 6
Mollusca. Bivalvia 1, 9, 11A
Echinodermata. Echinoidea 4, Holothuroidea 1-2, 9
Ascidiacea. Enterogona 8, 18, Pleurogona 10.

REMARKS: Stations 110-11 have the same fauna which is a mixture derived from the bivalvia-*Stichopus* sand community and the deeper water annelid echinoderm fauna of the silty clays to the south.

AREA 12 (112)
Depth. 9 fm
Substrate. Silty clay
Coelenterata. Hydroida 3, 6, Actinaria 1
Annelida. Polychaeta 1
Mollusca. Bivaliva 1, 9, 11A
Echinodermata. Echioidea 4, Holothuroidea 1-2, 9
Ascidiacea. Enterogona 18.

AREA 12 (113)
Depth. 10 fm
Substrate. Silty clay
Coelenterata. Hydrozoa 3, 6
Annelida. Polychaeta 1

Mollusca. Opisthobranchia 4, Bivalvia 1, 9
Echinodermata. Holothuroidea 1-2, 9
Ascidiacea. Enterogona 18.

AREA 12 (114)

Depth. 10 fm
Substrate. Silty clay
Annelida. Polychaeta 1
Mollusca. Bivalvia 2, 9, 21.

AREA 12 (196)

Depth. 11 fm
Substrate. Silty clay
Crustacea. Brachyura 8, 13
Mollusca. Opisthobranchia 11-12
Bryozoa. 6, 48-49, 53-54
Echinodermata. Ophiuroidea 5, Echinoidea 4, Holothuroidea 8-9.

AREA 12 (198)

Depth. 9 fm
Substrate. Clayey silt
Echinodermata. Ophiuroidea 5
Ascidiacea. Enterogona 18, Pleurogona 19.

REMARKS: This station is close to the dumping buoy and the silty clay of that station has spread from it.

AREA 12 (211)

Depth. 11 fm
Substrate. Silty clay
Annelida. Polychaeta 21
Echinodermata. Echinoidea 4, Holothuroidea 9.

AREA 13 (82)

Depth. 4 fm
Substrate. Sand
Coelenterata. Octocorallia 10
Crustacea. Isopoda 12, Brachyura 6, 13, 25-26
Mollusca. Bivalvia 9, 13
Echinodermata. Asteroidea 1.

AREA 13 (83)

Depth. 6-3 fm
Substrate. Sand
Coelenterata. Octocorallia 10
Crustacea. Brachyura 6-7, 13, 25
Mollusca. Gastropoda 32, 65, 68, Bivalvia 11A, 21, 26
Echinodermata. Echinoidea 4.

AREA 13 (92)

Depth. 4 fm
Substrate. Sand
Algae. Phaetophyta 42, 51, Rhodophyta 135
Coelenterata. Octocorallia 10
Annelida. Polychaeta 1, 26, 35, 40
Crustacea. Brachyura 4, 7, 13
Mollusca. Amphineura 2, Gasteropoda 15, 32, 34, 65, 80, 88-89, 92, 98, Opisthobranchia 4, 9, Bivalvia 9-10, 11A, 13-15, 18, 21
Echinodermata. Asteroidea 1-2, Echinoidea 4, Holothuroidea 1, 6.

AREA 13 (93)

Depth. 2 fm
Substrate. Sand
Algae. Phaeophyta 46, Rhodophyta 101, 135, 152
Coelenterata. Actinaria 6
Annelida. Polychaeta 44
Crustacea. Isopoda 12, 17
Mollusca. Amphineura 9, 12, 17, 20, Gastropoda 1, 15, 32, 38, 49, 80, 88-89, Bivalvia 9, 11A, 13
Echinodermata. Asteroidea 1, 14, Echinoidea 4.

AREA 13 (94)

Depth. 2 fm
Substrate. Sand
Annelida. Polychaeta 44
Crustacea. Brachyura 4-5, 13, 22, 25
Mollusca. Amphineura 9, 12, 17, 20, Gastropoda 4, 35, 66, Bivalvia 9, 13, 19
Echinodermata. Asteroidea 1.

AREA 13 (209)

Depth. 6-6 fm
Substrate. Silty clay
Annelida. Polychaeta 36
Crustacea. Brachyura 13.

AREA 13 (210)

Depth. 9 fm
Substrate. Silty clay
Annelida. Polychaeta 21, 36, 44, 53
Mollusca. Bivalvia 1, 9, 13, 42
Bryozoa 6
Echinodermata. Ophiuroidea 7, Echinoidea 4, Holothuroidea 9.

AREA 14 (4)

Depth. 4 fm
Substrate. Reef
Algae. Phaeophyta 51, Rhodophyta 102, 109, 141, 157, 167
Coelenterata. Scleractinia 1

Annelida. Echiuroidea 3
Crustacea. Brachyura 7, 22, 25
Mollusca. Bivalvia 9, 13
Ascidiacea. Pleurogona 15.

AREA 14 (5)

Depth. 3·3 fm
Substrate. Reef
Algae. Chlorophyta 16, Rhodophyta 141
Coelenterata. Scleractinia 1
Echinodermata. Asteroidea 10.

AREA 14 (8)

Depth. 3·5 fm
Substrate. Sand with reef outcropping
Annelida. Polychaeta 1, 34, 44
Mollusca. Bivalvia 9, 13
Ascidiacea. Pleurogona 15.

AREA 14 (95)

Depth. 1·6 fm
Substrate. Sand
Algae. Chlorophyta 2, 22, Phaeophyta 64, Rhodophyta 167
Annelida. 1, 7, 47, 60
Crustacea. Brachyura 7, 16, 21, 23, 26
Mollusca. Amphineura 9, 12, 17, 20, Gastropoda 15, 22, Bivalvia 9
Echinodermata. Asteroidea 1, 14, Echinoidea 2.

AREA 14 (116)

Depth. 3 fm
Substrate. Sand and reef
Algae. Chlorophyta 8, 11.

AREA 14 (117)

Depth. 2fm
Substrate. Sand and reef
Algae. Chlorophyta 8, 14, Rhodophyta 105, 139
Coelenterata. Hydrozoa 2
Mollusca. Gastropoda 32, 34, 66, Bivalvia 9, 13, 41
Echinodermata. Ophiuroidea 5
Ascidicacea. Pleurogona 15, 18.

REMARKS: The reef had a large population of sponges but it has not been possible to have the sponge collection worked in time for publication in this volume.

AREA 14 (175)

Depth. 2·5 fm
Substrate. Sand and reef
Annelida. Polychaeta 2, 20, 31, 42-43
Crustacea. Bracyhura 8
Mollusca. Amphineura 19, Gastropoda 1, 15, 34, 38, 80, Bivalvia 9, 9-11A, 13-14, 19, 21, 41
Ascidiacea. Pleurogona 18.

AREA 16 (142)

Depth. 2·5 fm
Substrate. Silty sand
Phanerogams 1
Algae. Chlorophyta 12, 14, Phaeophyta 57, Rhodophyta 101, 105, 154
Annelida. Polychaeta 44, 47
Crustacea. Isopoda 17, Brachyura 7, 22, 25
Mollusca. Gasteropoda 34, Bivalvia 9-10, 11A, 13
Echinodermata. Asteroidea 14.

AREA 16 (143)

Depth. 3·3 fm
Substrate. Silty sand and shell
Phanerogams. 1
Algae. Chlorophyta 22, Phaeophyta 57, Rhodophyta 101, 105, 154
Crustacea. Isopoda 17, Brachyura 13
Mollusca. Amphineura 17, Gastropoda 22, 32-34, 56, Bivalvia 9-10, 13, 25
Echinodermata. Echionidea 2.

AREA 16 (282)

Depth. 5 fm
Substrate. Silty clay
Annelida. Polychaeta 44
Crustacea. Brachyura 25
Mollusca. Gastropoda 98, Bivalvia 10, 15, 19, Opisthobranchia 4
Echinodermata. Asteroidea 2, Holothuroidea 1
Asediacea. Pleurogona 15.

AREA 16 (283)

Depth. 2·25 fm
Substrate. Clayey sand
Annelida. Polychaeta 11, 37, 39
Crustacea. Brachyura 4, 25
Mollusca. Gastropoda 80, Bivalvia 9, 23, 25, 29
Echinodermata. Asteroidea 2, Holothuroidea 1.

AREA 17 (170)
Depth. 5·5 fm
Substrate. Silty sand
Algae. Chlorophyta 12, 14, Rhodophyta 105, 120, 132, 139, 142, 144, 148, 157
Annelida. Polychaeta 1, 26, 27, 44, 47
Crustacea. Brachyura 13, 25, 29
Mollusca. Amphineura 12, 17, Gastropoda 98, Bivalvia 9-11A, 13
Ascidiacea. Pleurogona 11.

AREA 17 (171)
Depth. 4·5 fm
Substrate. Sandy silt
Algae. Chlorophyta 1, 12, 14, Rhodophyta 105, 120, 132, 139, 142, 144, 148, 157
Annelida. Polychaeta 26, 47
Mollusca. Bivalvia 9, 11A
Echinodermata. Holothuroidea 1.

AREA 17 (172)
Depth. 3 fm
Substrate. Sandy silt and reef
Algae. Chlorophyta 1, 14, Rhodophyta 132
Annelida. Polychaeta 26
Crustacea. Brachyura 22
Mollusca. Gastropoda 1, Bivalvia 13
Bryozoa 26.

AREA 17 (173)
Depth. 2 fm
Substrate. Sand
Algae. Chlorophyta 1, 14, 16, Rhodophyta 132
Crustacea. Brachyura 7, 16
Mollusca. Gastropda 15, 34, 96, Bivalvia 9, 13, 23.

AREA 18 (59)
Depth. 6 fm
Substrate. Fine sand
Algae. Chlorophyta 8, 14
Mollusca. Gastropoda 15, 32, 34-35, Bivalvia 10-11A, 13, 41
Echinodermata. Ophiuroidea 5, Holothuroidea 1
Ascidiacea. Pleurogona 9-10, 13.

AREA 18 (60)
Depth. 5 fm.
Substrate. Fine to medium sand
Algae. Rhodophyta 122, 151
Crustacea. Brachyura 16
Mollusca. Bivalvia 3, 10-11A, 41
Echinodermata. Asteroidea 1? Echinoidea 23, Holothuroidea 1?
Ascidiacea. Pleurogona 20.

AREA 18 (61)
Depth. 3·5 fm
Substrate. Fine to medium sand
Algae. Rhodophyta 122, 151
Coelenterata. Actinaria 6
Crustacea. Brachyura 7, 16
Mollusca. Opisthobranchia 12, Bivalvia 9, 11A, 15, 35
Ascidiacea. Enterogona 1, Pleurogona 3.

AREA 18 (182)
Depth. 4 fm
Substrate. Sand and shell fragments.

AREA 18 (183)
Depth. 3·3 fm
Substrate. Sand with skeletal fragments
Mollusca. Bivalvia 13.

AREA 18 (186)
Depth. 4 fm
Substrate. Fine sand
Phanerogams. 3
Porifera. *Tethya corticalis*?
Echinodermata. Echinoidea 4

REMARKS: This station is on the edge of the *Caulerpa* community as indicated by the *Halophila ovalis* and the specimens of silty sand fauna.

AREA 18 (187)
Depth. 6·3 fm
Substrate. Sand
Algae. Chlorophyta 12, 14?
Mollusca. Bivalvia 10, 11A, 13
Echinodermata. Holothuroidea 1
Ascidiacea. 13?

REMARKS: The *Caulerpa* is scattered at this station which is on the transition from sand to silty sand.

AREA 18 (188)
Depth. 6·6 fm
Substrate. Sand
Mollusca. Bivalvia 11A.

AREA 18 (189)
Depth. 6·75 fm
Substrate. Fine sand
Mollusca. Bivalvia 11A, 13.

REMARKS: This station falls within the *Caulerpa* community and the dominant species were recorded though not collected.

AREA 18 (307)

Depth. 6 fm
Substrate. Silty sand with some pebbles
Phanerogams. 3
Algae. Chlorophyta 12, 14, Rhodophyta 122
Annelida. Polychaeta 47, 52
Crustacea. Brachyura 14, 25
Mollusca. Bivalvia 11A, 13, 15, 21, Opisthobranchia 4
Echinodermata. Echinoidea 4.

AREA 18 (308)

Depth. 6 fm
Substrate. Silty sand
Algae. Rhodophyta 122
Annelida. Polychaeta 52
Crustacea. Brachyura 4, 8, 13-14, 22
Mollusca. Bivalvia 9, 11A, 13, Opisthobranchia 4
Echinodermata. Asteroidea 2, Holothuroidea 1, 8.

AREA 19 (179)

Depth 3·3 fm
Substrate. Coarse shelly sand and small pebbles
Crustacea. Brachyura 4, 7
Mollusca. Bivalvia 9-10, 23, Opisthobranchia 4
Ascidiacea. Pleurogona 13, 15.

REMARKS: The specimens collected are very similar to Area 9 (178) and both of them are probably influenced by the Werribee River.

AREA 19 (181)

Depth. 3·5 fm
Substrate. Coarse shelly sand
Algae. Chlorophyta 12, 14
Crustacea. Brachyura 4, 7
Mollusca. Gastropoda 32, 34, 56, 79, 96, Bivalvia 9-10, 25, Opisthobranchia 4
Ascidiacea. Pleurogona 13, 17.

REMARKS: This station is also in the *Caulerpa* community and is a continuation of the line from the Werribee River.

AREA 19 (304)

Depth. 7 fm
Substrate. Silty sand
Algae. Chlorophyta 14, 16
Coelenterata. Corallimorpharia 1
Crustacea. Brachyura 25
Mollusca. Gastropoda 80, 96, Bivalvia 11A, 19
Echinodermata. Ophiuroidea 5, Echinodermata, Echinoidea 4.

REMARKS: This is on the transition from the inshore *Caulerpa* to the central silty clay.

AREA 19 (305)

Depth. 9 fm
Substrate. Silty sand
Algae. Chlorophyta 8
Crustacea. Brachyura 8, 13
Mollusca. Gastropoda 80, 96, Bivalvia 9-10, 11A, 19
Echinodermata. Holothuroidea 2
Ascidiacea. Enterogona 17, Pleurogona 10.

AREA 19 (306)

Depth. 8·3 fm
Substrate.
Algae. Chlorophyta 8
Annelida. Polychaeta 1, 36, 39, 44, 47, 50
Mollusca. Gastropoda 80, 96, Bivalvia 9-10, 11A, 13
Echinodermata. Asteroidea 2, Holothuroidea 1, 8
Ascidiacea. Enterogona 8.

AREA 20 (124)

Depth. 12 fm
Substrate. Silty clay
Annelida. Polychaeta 50
Crustacea. Brachyura 8
Mollusca. Bivalvia 9-10, 11A, 15, 19, 33
Echinodermata. Asteroidea 1, Echinoidea 4.

AREA 20 (309)

Depth. 11 fm
Substrate. Silty clay
Annelida. Polychaeta 36
Crustacea. Brachyura 14
Mollusca. Bivalvia 21
Echinodermata. Ophiuroidea 7, Echinoidea 4, Holothuroidea 8
Ascidiacea. Enterogona 8.

AREA 21 (115)

Depth. 11 fm
Substrate. Silty clay
Coelenterata. Hydrozoa 6
Crustacea. Bracyura 13

Mollusca. Gastropoda 94, Bivalvia 9, 13, 21
Bryozoa. 54
Echinodermata. Ophiuroidea 7, Echinoidea 4, Holothuroidea 8-9
Ascidiacea. Enterogona 17.

AREA 21 (176)

Depth. 12 fm
Substrate. Silty clay
Algae. Rhodophyta 132
Annelida. Polychaeta 36
Mollusca. Bivalvia 9, 11A, 13, 21
Echinodermata. Asteroidea 2, Echinoidea 4
Ascidiacea. Enterogona 17, Pleurogona 15 on *Pecten alba.*

AREA 22 (119)

Depth. 11·5 fm
Substrate. Silty sand
Annelida. Polychaeta 36
Crustacea. Brachyura 4, 7, 23, 25
Mollusca. Bivalvia 9-10, 11A, 40
Echinodermata. Asteroidea 2, Echinoidea 4, Holothuroidea 2, 8
Ascidiacea. Enterogona 10, 17-18, Pleurogona 12.

AREA 23 (1)

Depth. 4·75 fm
Substrate. Sand
Mollusca. Cephalopoda 7
Ascidiacea. Pleurogona 15.

AREA 23 (2)

Depth. 4·75 fm
Substrate. Silty sand
Algae. Phaeophyta 47, 57
Crustacea. Brachyura 13
Mollusca. Opisthobranchia 4, Bivalvia 15
Echinodermata. Echinoidea 4.

AREA 23 (3)

Depth. 4·25 fm
Substrate. Sand
Algae. Chlorophyta 8, Phacophyta 51, Rhodophyta 88, 102, 109, 141, 157, 167
Coelenterata. Actinaria 6
Mollusca. Bivalvia 3.

AREA 23 (7)

Depth. 4·75 fm
Substrate. Sand
Algae. Phaeophyta 51
Annelida. Polychaeta 1, Echiuroidea 3
Mollusca. Bivalvia 9, 13, 15
Echinodermata. Asteroidea 16
Ascidacea. Enterogona 8, 17.

AREA 23 (9)

Depth. 5·25 fm
Substrate. Sand
Algae. Rhodophyta 89, 102, 109, 157, 167
Mollusca. Bivalvia 9, 13.

AREA 23 (68)

Depth. 8·5 fm
Substrate. Clayey sand
Crustacea. Brachyura 13
Mollusca. Bivalvia 9, 11A
Echinodermata. Ophiuroidea 4, 7, Holothuroidea 2
Ascidiacea. Enterogona 11, Pleurogona 12.

AREA 23 (69)

Depth. 8 fm
Substrate. Silty clay
Mollusca. Bivalvia 9, 11A
Ascidiacea. Enterogona 17, Pleurogona 12.

AREA 23 (70)

Depth. 9 fm
Substrate. Silty clay
Crustacea. Brachyura 13
Mollusca. Bivalvia 9, 11A
Ascidiacea. Enterogona 17-18, Pleurogona 12, 17-18.

AREA 23 (71)

Depth. 11 fm
Substrate. Silty clay
Crustacea. Brachyura 13
Mollusca. Bivalvia 1
Echinodermata. Ophiuroidea 5
Ascidiacea. Enterogona 18.

AREA 24 (122)

Depth.
Substrate. Sand
Coelenerata. Actinaria 3
Annelida. Polychaeta 1, 24, 37, 47, 53, Echiuroidea 3
Mollusca. Gatsropoda 35, 80, Bivalvia 9, 13, 19
Echinodermata. Holothuroidea 1
Ascidiacea. Pleurogona 15, 18.

AREA 25 (128)

Depth. 5 fm
Substrate. Silty clay
Annelida. Polychaeta 34, 37, 39, 41, 44
Mollusca. Opisthobranchia 4, Bivalvia 9-10, 11A, 15
Echinodermata. Asteroidea 15, Holothuroidea 1
Ascidiacea. Enterogonia 17, Pleurogona 15.

AREA 25 (129)

Depth. 1·5 fm
Substrate. Clayey sand
Coelenterata. Actinaria 12
Annelida. Polychaeta 11, 35
Crustacea. Brachyura 25, 30
Mollusca. Bivalvia 11A, 39
Echinodermata. Holothuroidea 1
Ascidiacea. Pleurogona 9.

REMARKS: *Pholas australasiae* is known to occur in the off-shore platforms along the W. side of the bay, but it was only at this site that it was collected in quantity on the survey.

AREA 25 (299)

Depth. 5 fm
Substrate. Clay
Algae. 12
Crustacea. Brachyura 23, 25
Mollusca. Bivalvia 10, 15
Bryozoa. 6
Echinodermata. Ophiuroidea 8
Ascidiacea. Enterogona 17.

AREA 26 (126)

Depth. 3·5 fm
Substrate. Silty clay
Phanerogams 1
Algae. Chlorophyta 12, Phaeophyta 45
Annelida. Polychaeta 39, 44, 47
Crustacea. Brachyura 25
Mollusca. Gastropoda 56, Bivalvia 2, 10, 33
Echinodermata. Asteroidea 9-10, 14, Ophiuroidea 8-9, Holothuroidea 1, 8
Ascidiacea. Enterogona 8, 17, Pleurogona 9, 15.

REMARKS: This area is comparatively barren with *Stichopus mollis* and *Ascidia gemmata* the dominant species.

AREA 26 (300)

Depth. 3 fm
Substrate. Clayey sand
Phanerogams 1, 3
Algae. Phaeophyta 41
Annelida. Polychaeta 21, 58
Crustacea. Brachyura 11, 25
Mollusca. Bivalvia 10 on *Halophila* 13, Cephalopoda 11
Echinodermata. Asteroidea 10, Holothuroidea 1, 5-6.

AREA 26 (301)

Depth. 2·5 fm
Substrate. Clayey sand
Algae. Chlorophyta 12, Phacophyta 41, 45, Rhodophyta 151
Crustacea. Brachyura 1, 13, 21-22, 25
Mollusca. Bivalvia 10, 13, 24
Echinodermata. Asteroidea 14, Echinoidea 2, Holothuroidea 5-6.

AREA 27 (41)

Depth. 1·5 fm
Substrate. Silty sand with reef outcropping
Algae. Chlorophyta 12, 16, 22, Phaeophyta 57A, Rhodophyta 102, 110, 122, 133, 167
Porifera. Several species of sponges
Coelenterata. Actinaria 6
Crustacea. Brachyura 7, 13, 16, 19, 21, 25
Mollusca, Amphineura 17, Gastropoda 1, 22, 26-27, 32, 34, 38, 52-53, 56, 88-89, 90, Bivalvia 2, 9-10, 13, 23, 25-26, 34
Echinodermata. Asteroidea 1, 7, 9-10, 14-15, Ophiuroidea 1, Echinoidea 2-3, Holothuroidea 1-2, 5-6
Ascidiacea. Enterogona 17, Pleurogona 11.

AREA 27 (47)

Depth. 3 fm
Substrate. Silty clay
Algae. Chlorophyta 6A, 12
Porifera. Two species of sponges
Annelida. Polychaeta 1
Mollusca. Bivalvia 9, 11A, 13
Echinodermata. Asteroidea 10, 14.

AREA 27 (48)

Depth. 3 fm
Substrate. Silty clay
Porifera. Two species of sponges
Annelida. Polychaeta 41
Mollussca. Opisthobranchia 4, 11, Bivalvia 9, 11A
Echinodermata. Ophiuroidea 9
Ascidiacea. Pleurogona 10.

AREA 27 (49)

Depth. 6 fm
Substrate. Silty clay
Porifera. One cream sponge
Crustacea. Cirripedia 1, Brachyura 14
Mollusca. Gastropoda 96, Bivalvia 9, 13, 15
Echinodermata. Holothuroidea 1.

AREA 27 (50)

Depth. 5 fm
Substrate. Silty clay
Porifera. Yellow and blue sponge
Crustacea. Cirripedia 1, Brachyura 14
Mollusca. Gastropoda 96, Bivalvia 9, 15
Ascidiacea. Pleurogona 10.

AREA 27 (138)

Depth. 2·5 fm
Substrate. Silty sand
Algae. Chlorophyta 12, 14, 22, Phaeophyta 57A, Rhodophyta 102, 105, 154
Annelida. Polychaeta 1, 34, 44
Crustacea. Isopoda 17, Brachyura 7, 19
Mollusca. Gastropoda 71, Opisthobranchia 10, Bivalvia 9, 13.
REMARKS: The dominant animal was *Mytilus planulatus*.

AREA 27 (139)

Depth. 1·5 fm
Substrate. Silty sand with reef outcropping 2 ft. above the sand
Phanerogams 1, 3
Algae. Chlorophyta 12, Phacophyta 57A, Rhodophyta 102, 105, 154
Porifera. Abundant on reef
Annelida. Polychaeta 37, 47
Crustacea. Isopoda 17, Brachyura 7
Mollusca. Gastropoda 71, Bivalvia 9, 13, 19
Echinodermata. Asteroidea 16, Echinoidea 2, Holothuroidea 1.

Area 27 (284)

Depth. 1·25 fm
Substrate. Silty sand with basalt pebbles
Algae. Chlorophyta 14, 16, Rhodophyta 120, 159
Annelida. Polychaeta 44, 59
Crustacea. Brachyura 4, 7
Mollusca. Gastropoda 15, 22, 32, 34, 52, 65, Bivalvia 9, 23
Echinodermata. Asteroidea 10, 15, Ophiuroidea 2
Ascidiacea. Pleurogona 20.

AREA 27 (302)

Depth. 4 fm
Substrate. Silty clay
Annelida. Polychaeta 41
Mollusca. Bivalvia 9, 23
Echinodermata. Ophiuroidea 8, Holothuroidea 5, 8
Ascidiacea. Pleurogona 9.

AREA 28 (140)

Depth. 3 fm
Substrate. Silty sand
Phanerogams. 1
Algae 57A, Rhodophyta 102, 105, 154, 158
Porifera, Several species of sponges
Annelida. Polychaeta 44
Crustacea. Brachyura 7, 25
Mollusca. Gastropoda 79, 98, Bivalvia 9-10, 13
Echinodermata. Asteroidea 1
Ascidiacea. Pleurogona 9, 11, 15.

AREA 28 (141)

Depth. 3·5 fm
Substrate. Silty sand
Phanerogams. 3
Algae. Phaeophyta 57A, Rhodophyta 102, 105, 154
Crustacea. Brachyura 13, 21, 26 in *Mytilus*
Mollusca. Gastropoda 34, Bivalvia 9, 13, 41
Echinodermata. Ophiuroidea 1, Echinoidea 2, Holothuroidea 1
Ascdiacea. Pleurogona 17.

AREA 28 (285)

Depth. 3 fm
Substrate. Silty sand.
Algae. Chlorophyta 17
Annelida. Polychaeta 4
Crustacea. Cirripedia 1, Isopoda 11, Brachyura 25
Mollusca. Amphineura 9, 17, Gastropoda 15, 32, 34, 79, Bivalvia 2, 10, 13, 25
Echinodermata. Holothuroidea 1, 6, 8
Ascidiacea. Enterogona 17, Pleurogona 13, 18.

AREA 28 (286)

Depth. 5 fm
Substrate. Silty clay
Annelida. Polychaeta 1, 11, 21, 31, 37, 39, 41, 44, 49
Crustacea. Brachyura 22
Mollusca. Bivalvia 15.

AREA 28 (316)
Depth. 6 fm
Substrate. Silty sand
Annelida. Polychaeta 14
Mollusca. Gastropoda 38, 80.

AREA 28 (315)
Depth. 5 fm
Substrate. Silty sand
Phanerogams. 3
Algae. Chlorophyta 12
Crustacea. Brachyura 25
Mollusca. Bivalvia 11A, 13
Echinodermata. Asteroidea 2, Holothuroidea 1
Ascidiacea. Enterogona 17.

AREA 29 (107)
Depth. 2-5 fm
Substrate. Sand
Algae. Chlorophyta 12, Rhodophyta 151, 152
Coelenterata. Hydrozoa 18, Actinaria 12
Annelida. Polychaeta 1, 14, 44
Crustacea. Brachyura 13
Mollusca. Gasteropoda 97, Bivalvia 9, 13
Echinodermata. Asteroidea 1
Ascidiacea. Pleurogona.

REMARKS: This station is on and around Portarlington Pier.

AREA 29 (174)
Depth. 6-25 fm
Substrate. Sandy silt
Algae. Rhodophyta 133
Mollusca. Gastropoda 98, Bivalvia 9, 11A, 21
Bryozoa. 26, 92
Echinodermata. Holothuroidea 1
Ascidiacea. Enterogona 17, Pleurogona 13, 15.

REMARKS: The fauna was very sparse, and the only algae *Ceramium* sp. was attached to *Pecten alba*.

AREA 29 (287)
Depth. 5-5 fm
Substrate. Sand-silt-clay
Algae. Chlorophyta 17
Crustacea. Brachyura 13
Mollusca. Bivalvia 10, 11A, 15
Echinodermata. Echinoidea 4, Holothuroidea 1
Ascidiacea. Pleurogona 15, 18.

AREA 29 (317)
Depth. 4-50 fm
Substrate. Silty sand
Algae. Chlorophyta 9
Annelida. Polychaeta 21
Mollusca. Gastropoda 98, Bivalvia 9-10, 11A
Echinodermata. Holothuroidea 1.

AREA 30 (130)
Depth. 6 fm
Substrate. Sand-clay-silt
Algae. Phaeophyta 51
Porifera. Two species
Coelentarata. Hydrozoa 6-7, 27, Octocorallia 3
Annelida. Polychaeta 26, 82, Echiuroidea 3
Crustacea. Isopoda 17, 26
Mollusca. Gastropoda 11, 15, 22, 32, 34, 38, 49, 79, 98, Bivalvia 9, 11A, 13, 15, 26, 38, 41
Bryozoa 26, 82, 91
Echinodermata. Asteroidea 1, 10A, 14, Echinoidea 2
Ascidiacea. Pleurogona 18.

AREA 30 (135)
Depth. 2 fm
Substrate. Sand with outcropping reef
Algae. Chlorophyta 1, Phacophyta 46? 57A?
Porifera. Abundant sponges on reef
Mollusca. Gastropoda 1, 3, 34, 38, 49, 79, Cephalopoda 11, Bivalvia 9, 15
Echinodermata. Asteroidea 1, Echinoidea 2, Holothuroidea 1
Ascidiacea. Pleurogona 18.

AREA 30 (278)
Depth. 8 fm
Substrate. Silty sand
Porifera. Red finger sponge
Crustacea. Isopoda 23, 24, Brachyura 7, 13, 21, 25
Mollusca. Gastropoda 91, Bivalvia 1, 10, 11A, 13
Echinodermata. Asteroidea 2, Holothuroidea 1
Ascidiacea. Enterogona 17? Pleourogona 13, 15.

AREA 30 (279)
Depth. 7 fm
Substrate. Sand-clay-silt
Porifera. Red finger sponge
Crustacea. Brachyura 21
Mollusca. Gastropoda 92, Bivalvia 1, 10, 11A, 13
Echinodermata. Astroidea 2, Holothuroidea 1
Ascidiacea. Enterogona 17? Pleurogona 13, 15.

AREA 30 (280)

Depth 8 fm
Substrate. Sandy gravel
Algae. Phacophyta 46, Rhodophyta 103, 124, 135, 156, 158, 159
Porifera. Large number including *Tethya* sp.
Coelenterata. Actinaria 7
Crustacea. Ispoda 17
Mollusca. Amphineura 9, 12, Gastropoda 22, 25, 38, 52-53, 64, 88, 90, Bivalvia 13
Echinodermata. Asteroidea 1-2, Echinoidea 2, Holothuroidea 1.

AREA 31 (10)

Depth. 5·25 fm
Substrate. Silty sand with broken rock
Algae. Phacophyta 68
Porifera. Very common
Coelenterata. Hydrozoa 6, 27, Actinaria 7, Octocorallia 2
Annelida. Polychaeta 1-2, 20, 26, 41, 43-44, 50, 54
Crustacea. Brachyura 3, 4, 7
Mollusca. Amphineura 20, Gastropoda 1, 3, 11, 15, 32, 34, 49, Bivalvia 9-10, 11A, 13, 41, Cephalopoda 9
Echinodermata. Crinoidea 6, Asteroidea 1, 10, 14, 15, Ophiuroidea 5, Echinoidea 2-3, Holothuroidea 1
Ascidiacea. Pleurogona 11, 15-16, 19.

REMARKS: This station is situated at the Prince George Light. The specimen was collected from the rocks at the base and the surrounding silty sand. The piles of the light were completely encrusted with *Mytilus planulatus,* while the sea-floor under the piles was carpeted witih smaller specimens.

AREA 31 (131)

Depth. 8 fm
Substrate. Sand-clay-silt
Annelida. Polychaeta 47, 53, 56
Crustacea. Brachyura 21
Mollusca. Gastropoda 22, Bivalvia 8, 19.

AREA 31 (132)

Depth. 8·5 fm
Substrate. Silty clay
Crustacea. Isopoda 17, 26, Brachyura 21
Mollusca. Gastropoda 1, 98, Opisthobranchia 4, Bivalvia 9-10, 11A
Ascidiacea. Pleurogona 11, 18.

AREA 31 (133)

Depth. 9·5 fm
Substrate. Silty clay
Annelida. Polychaeta 34? 36?, 39?
Crustacea. Brachyura 21
Mollusca. Bivalvia 9, 15
Echinodermata. Holothuroidea 1, 5?
Ascidiacea. Pleurogona 11.

AREA 31 (134)

Depth. 9·5 fm
Substrate. Silty clay
Crustacea. Brachyura 21
Mollusca. Bivalvia 9, 15
Echinodermata. Asteroidea 2? Holothuroidea 1, 5
Ascidiacea. Pleurogona 11.

AREA 31 (273)

Depth. 8 fm
Substrate. Silty clay
Porifera. Red branching sponge
Mollusca. Opisthobranchia 4, 9, Bivalvia 1, 10, 11A, 13, Cephalopoda 9
Echinodermata. Asteroidea 2, Holothuroidea 1
Ascidiacea. Pleurogona 13, 15.

AREA 31 (275)

Depth. 3 fm
Substrate. Sand with broken shell and pebbles
Annelida. Polychaeta 36?
Crustacea. Brachyura 7
Mollusca. Bivalvia 10, 21
Ascidiacea. Pleurogona 15.

AREA 31 (276)

Depth. 8 fm
Substrate. Silt-sand-clay
Annelida. Polychaeta 34, 36, 39
Mollusca. Gastropoda 65, Bivalvia 9-10, 11A, 13
Echinodermata. Asteroidea 2.

AREA 31 (310)

Depth. 3·5-5·5 fm
Substrate. Sand and reef
Algae. Chlorophyta 16? Phaeophyta 68
Coelenterata. Octocorallia 10
Annelida. Polychaeta 1
Crustacea. Brachyura 13
Mollusca. Bivalvia 10, 13
Ascidiacea. Enterogona 18?

AREA 32 (277)

Depth. 13 fm
Substrate. Junction of silty clay and clay
Annelida. Polychaeta 34, 36, 38
Mollusca. Bivalvia 9, 13, 21
Echinodermata. Ophiuroidea 4, 7, Echinoidea 4, Holothuroidea 8, 9
Ascidiacea. Enterogona 18, Pleurogona 10.

REMARKS: This station has a typical central mud basin fauna.

AREA 33 (177)

Depth. 12 fm
Substrate. Silty clay
Coelenterata. Actinaria 11
Anneldia. Polychaeta 34, 44, 56?
Crustacea. Brachyura 7-8
Mollusca. Bivalvia 9, 11A, 13
Echinodermata. Ophiuroidea 7, Echinoidea 4, Holothuroidea 9
Ascidiacea. Enterogona 8, 17-18, Pleurogona 18.

AREA 34 (120)

Depth. 11 fm
Substrate. Silty clay
Porifera. Large yellow sponge
Mollusca. Gastropoda 34, Bivalvia 9-10, 11A, 13
Echinodermata. Asteroidea 2, Echinoidea 4, Holothuroidea 2
Ascidiacea. Enterogonia 17, Pleurogona 15, 17.

AREA 35 (71)

Depth. 11 fm
Substrate. Silty clay
Annelida. Polychaeta 1
Crustacea. Brachyura 7-8
Mollusca. Bivalvia 9, 11A
Bryozoa. 53-54, 69, 96
Echinodermata. Echinoidea 4
Ascidiacea. Enterogona 17?

AREA 35 (72)

Depth. 9 fm
Substrate. Silty clay
Annelida. Polychaeta 1?, 44
Crustacea. Brachyura 7-8
Mollusca. Gastropoda 96, Bivalvia 9, 11A, 13
Echinodermata. Ophiuroidea 7
Ascidiacea. Enterogona 18.

AREA 35 (73)

Depth. 9 fm
Substrate. Clayey sand
Crustacea. Brachyura 25-26
Mollusca. Bivalvia 9
Echinodermata. Holothuroidea 1
Ascidiacea. Enterogona 8, Pleurogona 16.

AREA 35 (121)

Depth. 11 fm
Substrate. Silty clay
Annelida. Echiuroidea 3
Crustacea. Brachyura 13, 22
Mollusca. Bivalvia 13
Echinodermata. Asteroidea 2
Ascidiacea. Enterogona 18, Pleurogona 17-18.

AREA 36 (74)

Depth. 8 fm
Substrate. Silty sand
Mollusca. Bivalvia 9, 11A
Ascidiacea. Pleurogona 15.

REMARKS: This was a very barren station with scattered clumps of *Mytilus planulatus* approximately 50 cm apart.

AREA 36 (75)

Depth. 8 fm
Substrate. Sand
Porifera. Some sponges
Annelida. Polychaeta 40, 44
Crustacea. Brachyura 7-8
Mollusca. Bivalvia 9
Echinodermata. Asteroidea 1, Holothuroidea 2, 6
Ascidiacea. Enterogona 8, Pleurogona 13?, 15?

AREA 36 (76)

Depth. 5 fm
Substrate. Sand
Porifera. Some sponges
Annelida. Polychaeta 40, Echiuroidea 3
Crustacea. Cirripedia 3, Brachyura 8
Mollusca. Amphineura 16A, Gastropoda 96, Bivalvia 9, 13, 16, 19
Ascidiacea. Pleurogona 15.

AREA 36 (77)

Depth. 4 fm
Substrate. Sand
Porifera. A few sponges
Annelida. Polychaeta 40, 44

Crustacea. Cirripedia 3, Brachyura 8, 13, 22
Mollusca. Amphineura 9, Gastropoda 15, 32, 35, Bivalvia 9, 13, 15, 19
Echinodermata. Holothuroidea 2, 6.

AREA 36 (78)

Depth. 4 fm
Substrate. Sand
Mollusca. Bivalvia 9
Echinodermata. Holothuroidea 8 (single specimen)
Ascidiacea. Pleurogona 15.

REMARKS: The single specimen of *Leptosynapta dolabrifera* was out of its usual environment and had probably arrived by mischance.

AREA 37 (4)

Depth. 2 fm
Substrate. Silty clay and some reef
Algae. Chlorophyta 12, Phaeophyta 57A, Rhodophyta 141, 154
Porifera. Several species of sponges
Annelida. Polychaeta 11, 35, 39
Crustacea. Isopoda 17, Brachyura 13, 21, 25, 30
Mollusca. Amphineura 15, Gastropoda 15, 32, 34, 97-98, Opisthobranchia 1, Bivalvia 2, 9-10, 15, 23, 26, 35, Cephalopoda 10
Echinodermata. Asteroidea 1, 7, 9, 10A, Echinoidea 2
Ascidiacea. Enterogona 13, 18, Pleurogona 11, 20.

REMARKS: This station on Thompson's Reef, Stingaree Bay, Geelong, has the typical sheltered reef and silty clay fauna.

AREA 37 (296)

Depth. 2 fm
Substrate. Clay
Algae. Chlorophyta 12
Annelida. Polychaeta 35
Crustacea. Brachyura 25
Mollusca. Gastropoda 97, Opisthobranchia 1, 4, 6, 15, Bivalvia 35, Cephalopoda 2
Ascidiacea. Enterogona 18.

AREA 37 (297)

Depth. 1 fm
Substrate. Clay
Phanerogams. 1, 3
Algae. Chlorophyta 12
Annelida. Polychaeta 35
Mollusca. Opisthobranchia 1, 6, 15, Bivalvia 10, 15, 35, Cephalopoda 2
Bryozoa. 6
Echinodermata. Asteroidea 10, Holothuroidea 1
Ascidiacea. Enterogona 18.

AREA 37 (298)

Depth. 4·5 fm
Substrate. Clay
Mollusca. Bivalvia 13, Cephalopoda 2
Bryozoa 6.

AREA 38 (127)

Depth. 5 fm
Substrate. Silty clay
Algae. Chlorophyta 1?
Annelida. Polychaeta 44
Mollusca. Opisthobranchia 4, Bivalvia 9-10, 11A, 33
Echinodermata. Asteroidea 9, 14, Holothuroidea 1
Ascidiacea. Enterogona 13, Pleurogona 9, 15.

AREA 38 (311)

Depth. 4 fm
Substrate. Clay
Algae. Chlorophyta 12
Annelida. Polychaeta 35, 41
Mollusca. Bivalvia 10 in *Caulerpa*
Echinodermata. Ophiuroidea 9
Ascidiacea. Enterogona 8.

AREA 39 (42)

Depth. 1·25 fm
Substrate. Sand
Phanerogams. 1
Algae. Phacophyta 57A
Mollusca. Gastropoda 22, 38, 52, 56, 80, 101, Bivalvia 2, 8, 10, 33
Echinodermata. Asteroidea 1, Echinoidea 3, Holothuroidea 1
Ascidiacea. Pleurogona 9.

AREA 39 (43)

Depth. 2·50 fm
Substrate. Silty sand
Phanerogams. 1
Algae. Phaeophyta 57A
Annelida. Polychaeta 15
Crustacea. Brachyura 7-8, 21, 22, 25
Mollusca. Gasteropoda 22, Bivalvia 10
Echinodermata. Asteroidea 10
Ascidiacea. Pleurogona 11, 15.

AREA 39 (44)

Depth. 3·50 fm
Substrate. Silty sand
Phanerogams. 1
Algae. Chlorophyta 12, Phacophyta 57A
Mollusca. Gastropda 56, 102, Bivalvia 10.

AREA 39 (45)

Depth. 3·50 fm
Substrate. Silty sand
Phanerogams. 1, 3
Algae. Phacophyta, 57A
Porifera. Some yellow sponges
Crustacea. Brachyura 16, 25
Mollusca. Gastropoda 80, Bivalvia 9-10, 11A, 13
Echinodermata. Ophiuroidea 9.

AREA 39 (46)

Depth. 3 fm
Substrate. Silty clay
Phanerogams. 1, 3
Algae. Phaeophyta 57A
Porifera. Four species of sponges
Crustacea. Cirripeda 1, Isopoda 17, 23, Brachyura 25
Mollusca. Bivalvia 9-10, 11A, 13
Echinodermata. Echinoidea 4, Holothuroidea 1
Ascidiacea. Pleurogona 18?

AREA 39 (312)

Depth. 4 fm
Substrate. Silty clay-clay
Annelida. Polychaeta 41
Crustacea. Isopoda 7, 17
Mollusca. Bivalvia 10
Echinodermata. Asteroidea 14, Ophiuroidea 8-9, Holothuroidea 8-9
Ascidiacea. Pleurogona 15.

AREA 39 (313)

Depth. 1·5 fm
Substrate. Sand passing into silty sand as dredge moved N. of shore
Phanerogams. 1
Algae. Chlorophyta 12, Phaeophyta 45, 57A, Rhodophyta 154
Crustacea. Isopoda 7, 17
Mollusca. Gastropoda 22, 34, 38, 52-53, 86, 97, 99, Bivalvia 2
Ascidiacea. Pleurogona 15.

AREA 39 (314)

Depth. 4·50 fm
Substrate. Silty clay
Algae. Chlorophyta 12?
Annelida. Polychaeta 10, 39
Crustacea. Isopoda 7, 17, Brachyura 25
Mollusca. Opisthobranchia 4, Bivalvia 11A, 15
Echinodermata. Echinoidea 4, Holothuroidea 1
Ascidiacea. Enterogona 17, Pleurogona 15.

AREA 40 (101)

Depth. 1 fm
Substrate. Sand
Phanerogams. 1
Algae. Chlorophyta 1, 16, Phaeophyta 57A
Porifera. A wide variety
Annelida. Polychaeta 20
Crustacea. Brachyura 11, 16, 22, 25, 29
Mollusca. Gastropoda 22, 32, 34, 38, 51-52, 53, 56, 88, 97-98, Opisthobranchia 10, 15, 33
Echinodermata. Asteroidea 1, 10, 14-15, Ophiuroidea 5, Echinoidea 4, Holothuroidea 1
Ascideacea. Pleurogona 15, 18.

AREA 40 (102)

Depth. 5 fm
Substrate. Silty sand
Crustacea. Brachyura 16
Mollusca. Bivalvia 15
Echinodermata. Asteroidea 10, Holothuroidea 1
Ascidiacea. Enterogona 8, Pleurogona 18.

REMARKS: Station 101 was situated in and around the Clifton Springs jetty where the *Zostera* was dense. A dredge run was made for this station on a course due N. on a contiuous bed of *Zostera* until a depth of 3·5 fm was reached. After this depth the *Zostera* occurred in broken patches with sand between the clumps. These clumps continued to 4·75 fm where *Halophilus ovalis* replaced the *Zostera*. Station 102 is at the end of the dredge run.

AREA 42 (38)

Depth. Intertidal and sub-littoral to 1 fm
Substrate. Sand
Algae. Phacophyta 66, Rhodophyta 91, 102
Coelenterata. Actinaria 3, 6, 9
Annelida. Polychaeta 18, 20, 43
Crustacea. Isopoda 16, Brachyura 4, 15, 24
Mollusca. Amphineura. 5, 14-15, 17, Gastropoda 3, 5, 8, 12, 30-31, 39, 67, 76, 80, 95,

98, 108, 110, Opisthobranchia 4, 10, 14
Bryozoa. 72
Echinodermata. Asteroidea 1, 10, 15-16, Echinoidea 2, Holothuroidea 1, 6
Ascidiacea. Enterogona 14, 18.

REMARKS: This station was worked from the shore by intertidal collecting and by divers working from the shore to 1 fm. The area traversed was from Indented Head southward for two miles.

AREA 42 (108)

Depth. 2 fm
Substrate. Sand
Algae. Phaeophyta 69-70, Rhodophyta 136, 150, 155-156, 158
Coelenterata. Hydrozoa 8
Annelida. Polychaeta 21
Crustacea. Brachyura 11, 13-14, 16, 25-26
Mollusca. Gastropoda 5, 17, 32, 34, 49, 56, 75-76, 80, 88, 97, Bivalvia 9-10, 13, 23
Echinodermata. Asteoridea 14-15, Ophiuroidea 5
Ascidiacea. Pleurogona 14-15, 18.

REMARKS: This station is at St Leonards Pier.

AREA 42 (109)

Depth. 2·5 fm
Substrate. Sand and broken shell
Algae. Rhodophyta 125, 150, 152, 156, 158-159, 164
Annelida. Polychaeta 22, 25, 35, 39
Crustacea. Brachyura 7-8, 13-14, 16, 25
Mollusca. Gastropoda 78, Bivalvia 9-10, 13
Echinodermata. Holothuroidea 1.

AREA 42 (264)

Depth. 4 fm
Substrate. Sand
Phanerogams. 1
Algae. Chlorophyta.

REMARKS: This dredge haul was almost barren in contrast to the next station (265) which had a varied flora. These two stations are in Coles Channel.

AREA 42 (265)

Depth. 3·5 fm
Substrate. Sand
Phanerogams. 1, 3
Algae. Phaeophyta 55, 57A, 73, Rhodophyta 102-103, 124, 159, 164
Annelida. Polychaeta 31, 44
Mollusca. Bivalvia 13, 23
Ascidiacea. Pleurogona 15, 18.

AREA 42 (281)

Depth. 2 fm
Substrate. Sand and reef
Phanerogams. 1
Algae. Phaeophyta 57A, 64, Rhodophyta 91, 102, 107, 154
Porifera. Some sponges
Coelenterata. Scleractinia 1?
Annelida. Polychaeta 44, 53
Crustacea. Brachyura 7, 21 23
Mollusca. Amphineura 17, 20, Gastropoda 3, 22, 25, 38, Bivalvia 10
Echinodermata. Asteroidea 2, 10A, 16, Echinoidea 2
Ascidiacea. Pleurogona 19.

AREA 42 (288)

Depth. 2 fm
Substrate. Sand and rock pebbles
Phanerogams. 1
Crustacea. Brachyura 4, 25
Mollusca. Gastropoda 92, Bivalvia 13, 23
Ascidiacea. Pleurogona 15.

AREA 42 (289)

Depth. 2 fm
Substrate. Sand
Annelida. Polychaeta 21, 29, 34
Crustacea. Brachyura 4
Mollusca. Opisthobranchia 4, Gastropoda 70, Bivalvia 23
Echinodermata. Ophiuroidea 9.

AREA 43 (251)

Depth. 10·5 fm
Substrate. Sand-clay-silt
Annelida. Polychaeta 53?
Crustacea. Brachyura 6
Echinodermata. Ophiuroidea 7, 15, Echinoidea 4
Ascidiacea. Enterogona 17.

AREA 43 (263)

Depth. 9 fm
Substrate. Silty clay
Phanerogams. 1, 4
Annelida. Polychaeta 36

Crustacea. Brachyura 8
Mollusca. Bivalvia 1, 11A, 42-43
Echinodermata. Ophiuroidea 7, Echinoidea 4.

AREA 43 (274)

Depth. 6 fm
Substrate. Silty sand
Porifera. Orange branching sponge
Annelida. Polychaeta 41, 53
Mollusca. Bivalvia 11A, 13, 15, 43
Echinodermata. Echinoidea 4, Holothuroidea 1
Ascidiacea. Enterogona 8? 17, Pleurogona 19?

REMARKS: This station situated at the meeting point of several communities contains elements of fauna derived from the surrounding communities and does not belong to any one type.

AREA 43 (303)

Depth. 3·5 fm
Substrate. Sand with shell and pebbles
Phanerogams. 1
Algae. Phaeophyta 32, 169
Coelenterata. Hydrozoa 6, 24, 28, Actinaria 12
Crustacea. Brachyura 4, 14
Mollusca. Gastropoda 82, 88, 96, Bivalvia 9-10, 11A
Bryozoa. 91
Echinodermata. Asteroidea 14
Ascidiacea. Enterogona 8.

AREA 44 (262)

Depth. 13 fm
Substrate. Clay
Annelida. Polychaeta 53
Echinodermata. Ophiuroidea 7, Echinoidea 4, Holothuroidea 8-9.

AREA 45 (261)

Depth. 13 fm
Substrate. Clay
Annelida. Polychaeta 53
Echinodermata. Ophiuroidea 7, Echinoidea 4, Holothuroidea 8-9.

AREA 46 (260)

Depth. 11 fm
Substrate. Clay
Annelida. Polychaeta 53
Echinodermata. Ophiuroidea 7, Echinoidea 4, Holothuroidea 8-9.

REMARKS: Stations 260-2 are typical of the sparse annelid echinoderm fauna of the clay basin.

AREA 47 (28)

Depth. 8·25 fm
Substrate. Silty sand
Mollusca. Bivalvia 11A
Echinodermata. Echinoidea 4
Ascidiacea. Pleurogona 15.

AREA 47 (29)

Depth. 5 fm
Substrate. Coarse sand
Algae. Chlorophyta 4, Rhodophyta 139
Coelenterata. Actinaria 7
Crustacea. Cirripedia 1, Brachyura 22
Mollusca. Bivalvia 9, 11A, 13, Cephalopoda 10
Ascidiacea. Enterogona 8, Pleurogona 15, 18.

AREA 47 (30)

Depth. 3 fm
Substrate. Sand
Algae. Chlorophyta 4, 16, Phacophyta 68, Rhodophyta 135, 167
Porifera. Yellow sponge
Mollusca. Bivalvia 9, 13, 26
Echinodermata. Ophiuroidea 5
Ascidiacea. Pleurogona 13.

AREA 47 (31)

Depth. 3 fm
Substrate. Sand
Algae. Chlorophyta 4, 16
Mollusca. Bivalvia 11A.

AREA 47 (258)

Depth. 8·5 fm
Substrate. Clay
Annelida. Polychaeta 53
Echinodermata. Ophiuroidea 7, Echinoidea 4, Holothuroidea 8-9.

AREA 47 (259)

Depth. 10·5 fm
Substrate. Clay
Annelida. Polychaeta 36
Mollusca. Bivalvia 9, 11A, 15
Echinodermata. Ophiuroidea 7, Echinoidea 4, Holothuroidea 8-9.

REMARKS: This station is on the junction of several faunal communities and contains representatives of each of them.

AREA 48 (32)
Depth. 2·5 fm
Substrate. Sand
Algae. Chlorophyta 1, 2OA
Mollusca. Amphineura 7, Gastropoda 53, 93, Bivalvia 13, 22, 27.

AREA 48 (33)
Depth. 2 fm
Substrate. Sand
Mollusca. Bivalvia 27.

REMARKS: A very barren area between two similar faunas 32 and 34.

AREA 48 (34)
Depth. 1·5 fm
Substrate. Sand
Algae. Chlorophyta 1
Porifera. Some sponges
Mollusca. Amphineura 6, Gastropoda 12, 23, Bivalvia 9
Echinodermata. Asteroidea 9, 14, Echinoida 4.

AREA 48 (257)
Depth. 4 fm
Substrate. Coarse sand
Algae. Chlorophyta 8
Annelida. Echiuroidea 3?
Mollusca. Bivalvia 10
Ascidiacea. Pleurogona 15.

REMARKS: This station is off Frankston Pier.

AREA 49 (236)
Depth. 0·5 fm
Substrate. Clayey sand
Phanerogam. 1
Annelida. Polychaeta 35, 38, 44, 47
Crustacea. Isopoda 2, Brachyura 5
Mollusca. Gastropoda 30, 47-48, 51-52, 55, 65.

AREA 49 (237)
Depth. 0·5 fm
Substrate. Clayey sand
Phanerogam. 1
Annelida. Polychaeta 1, 35-36, 44
Crustacea. Brachyura 25.

AREA 50 (228)
Depth. 3·5 fm
Substrate. Sand
Algae. Chlorophyta 2, 9?, 10, Phaeophyta 58, Rhodophyta 153, 158
Crustacea. Brachyura 7, 14, 16, 25
Mollusca. Gastropoda 32, 34, 96, Bivalvia 15, 23
Echinodermata. Asteroidea 1?
Ascidiacea. Pleurogona 15, 18.

AREA 50 (229)
Depth. 2·5 fm
Substrate. Sand
Phanerogams. 1, 3-4
Algae. Phaeophyta 41, Rhodophyta 74, 80, 97
Mollusca. Bivalvia 10
Bryozoa. 34
Echinodermata. Asteroidea 10.

AREA 50 (230)
Depth. 3 fm
Substrate. Sand
Phanerogam. 1
Algae. Chlorophyta 8-9, 16, Phaeophyta 42, 57A, 65, 67, Rhodophyta 143
Mollusca. Amphineura 13, Opisthobranchia 7, Gastropoda 25, 28, 32, 34, 39, 58, 65, 88, 96, Bivalvia 4, 9-10, 23
Echinodermata. Asteroidea 10A.

AREA 50 (231)
Depth. 2 fm
Substrate. Sand and pebbles
Algae. Chlorophyta 8-9, Phaeophyta 42, 57A, 65, 67, Rhodophyta 143
Mollusca. Gastropoda 28, 34, 39, 58, 65, 88, Bivalvia 9-10.

AREA 50 (232)
Depth. 2 fm
Substrate. Sand.

REMARKS: This station on the edge of the William Sand was barren.

AREA 50 (233)
Depth. 2 fm
Substrate. Sand
Phanerogams. 1
Porifera. On oysters
Annelida. Polychaeta 44?
Crustacea. Isopoda 11, 14, 23, Brachyura 7, 11, 13
Mollusca. Bivalvia 9, 13
Echinodermata. Crinoidea 3, Ophiuroidea 2, 10
Ascidiacea. Pleurogona 15, 18.

AREA 50 (238)

Depth. 1 fm
Substrate. Clayey sand
Phanerogam. 1
Algae. Chlorophyta 16, 24, Rhodophyta 92
Crustacea. Brachyura 7
Mollusca. Gastropoda 22, 34, 38, 54, 80, Bivalvia 23.

AREA 50 (266)

Depth. 2·5 fm
Substrate. Sand
Phanerogams. 4
Algae, Phaeophyta 57A, Rhodophyta 154, 164
Mollusca. Bivalvia 15
Ascidiacea. Pleurogona 20 on *Cymodocea* stems.

AREA 50 (267)

Depth. 2·5 fm
Substrate. Sand and reef
Phanerogams. 1, 3
Echinodermata. Crinoidea 1.

AREA 51 (250)

Depth. 3·5 fm
Substrate. Coarse sand
Phanerogam. 1
Algae. Rhodophyta 158, 164, 169
Porifera. Some sponges
Crustacea. Isopoda 14, Brachyura 7, 16, 22
Mollusca. Gastropoda 25, 63, Bivalvia 9-10, 14, 25
Ascidiacea. Pleurogona 2, 15, 18.

AREA 51 (270)

Algae. Rhodophyta 90
Annelida. Polychaeta 1, 11, 24, 35
Crustacea. Isopoda 14
Mollusca. Bivalvia 9
Echinodermata. Holothuroidea 1, 9
Ascidiacea. Pleurogona 20

REMARKS: This station in Symonds Channel had a very large population of *Mytilus planulatus*, most larger than 18 mm.

AREA 51 (271)

Depth. 6 fm
Substrate. Sand
Algae. Rhodophyta 90
Coelenterata. Hydrozoa 22, 28
Crustacea. Brachyura 7, 14, 16
Mollusca. Gastropoda 78.

REMARKS: The sand is ridged and moving. The ridges are approximately 2·5 cm high and with 10 cm between crests.

AREA 52 (252)

Depth. 13 fm
Substrate. Clay
Annelida. Polychaeta, 50, 53
Echinodermata. Ophiuroidea 7, Echinoidea 4, Holothuroidea 8-9
Ascidiacea. Enterogona 17, Pleurogona 14.

AREA 53 (253)

Depth. 12 fm
Substrate. Clay
Coelenterata. Hydrozoa 28
Annelida. Polychaeta 36, 41, 50, 53
Crustacea. Brachyura 8
Mollusca. Bivalvia 13, 15
Bryozoa. 22, 53
Echinodermata. Ophiuroidea 7.

AREA 54 (254)

Depth. 10 fm
Substrate. Sand-silt-clay
Annelida. Polychaeta 44?
Mollusca. Bivalvia 21
Echinodermata. Ophiuroidea 7, 14, Echinoidea 4, Holothuroidea 8-9.

AREA 55 (22)

Depth. 4·5 fm
Substrate. Sand
Algae. Chlorophyta 22, Rhodophyta 141, 157
Porifera. A number of sponges
Crustacea. Cirripedia 1
Mollusca. Gastropoda 49, 79, Bivalvia 9, 13
Echinodermata. Ophiuroidea 12
Ascidiacea. Enterogona 18, Pleurogona 15.

AREA 55 (35)

Depth. 3·5 fm
Substrate. Sand
Algae. Phacophyta 42, 47, 51, 61, Rhodophytae 90, 155
Coelenterata. Actinaria 5, Octocorallia 2
Annelida. Echiuroidea 3
Crustacea. Isopoda 1, Brachyura 7, 13, 20
Mollusca. Gastropoda 68, 93, 98, Bivalvia 18, Cephalopoda 7
Ascidiacea. Enterogona 1.

AREA 55 (39)

Depth. 2 fm
Substrate. Sand
Algae. Chlorophyta 1-2, Phaeophyta 32, 71, Rhodophyta 154
Annelida. Polychaeta 12, 40, Echuroidea 1-2
Crustacea. Brachyura 7, 13, 16, 29
Mollusca. Amphineura 4, 8, 12, Gastropoda 1, 15, 56, Opisthobranchia 2, 10, Bivalvia 2, 9-10, 13, 23, 25, 34
Bryozoa. 54, 95, 96
Echinodermata. Asteroidea 1, 14-16, Echinoidea 2, Holothuroidea 6
Ascidiacea. Enterogona 7.

AREA 55 (144)

Depth. 10 fm
Substrate. Sand-clay-silt
Coelenterata. Octocorallia 3
Annelida. Polychaeta 44, Sipunculoidea 3
Mollusca. Bivalvia 9, 11A
Echinodermata. Holothuroidea 8
Ascidiacea. Pleurogona 15.

AREA 58 (145)

Depth. 8·75 fm
Substrate. Sand-clay-silt
Annelida. Polychaeta 44?
Mollusca. Bivalvia 13
Echinodermata. Ophiuroidea 5, Holothuroidea 8-9
Ascidiacea. Pleurogona 15.

AREA 55 (146)

Depth. 8 fm
Substrate. Sandy silt
Annelida. Polychaeta 36
Mollusca. Bivalvia 1, 11A, 13
Echinodermata. Echinoidea 4
Ascidiacea. Pleurogona 15.

AREA 55 (147)

Depth. 5·5 fm
Substrate. Sandy silt
Crustacea. Isopoda 12, 18, 26, Brachyura 25
Mollusca. Amphineura 2, 20, Gastropoda 11, 15, 19, 32, 65, 80, Bivalvia 13, 15, 37-38, Cephalopoda 11
Brachiopoda. 1
Echinodermata. Asteroidea 2, Ophiuroidea 8.

AREA 55 (148)

Depth. 3·5 fm
Substrate. Sand
Algae. Chlorophyta 23, Phaecophyta 47, 64, 132
Coelenterata. Scleractinea 1
Annelida. 1, 13, 18, 20, 25-27, 61
Crustacea. Cirripedia 2
Mollusca. Gastropoda 38, Bivalvia 3, 12, 41
Echinodermata. Asteroidea 1, Echinoidea 4, Holothuroidea 1-2, 6
Ascidiacea. Pleurogona 10.

AREA 55 (149)

Depth. 2·5 fm
Substrate. Sand
Algae. Phaeophyta 43, 47
Crustacea. Brachyura 8, 13, 21
Mollusca. Gastropoda 4, Bivalvia 3, 9
Bryozoa. 33, 41, 53

AREA 55 (255)

Depth. 6 fm
Substrate. Sand
Annelida. Polychaeta 53
Crustacea. Brachyura 7-8
Mollusca. Bivalvia 11A
Echinodermata. Holothuroidea 8?, 9?
Ascidiacea. Enterogona 8?, 17, Pleurogona 4?, 15.

AREA 56 (256)

Depth. 4 fm
Substrate. Sand
Annelida. Polychaeta 35-36, 53
Crustacea. Brachyura 4, 13
Mollusca. Bivalvia 10, 11A, 13, 15
Ascidiacea. Enterogona 8?, 17?, Pleurogona 15.

AREA 56 (295)

Depth. 3 fm
Substrate. Sand and dune limestone reef
Algae. Chlorophyta 2, 11, 13, Phacophyta 28, 31, 56, Rhotophyta 82-83, 96, 99, 111, 131, 168
Mollusca. Gastropoda 1, 23, 37, 49, 82, Bivalvia 9, 37, Opisthobranchia 15
Bryozoa. 60, 63, 85, 87, 90, 96
Echinodermata. Holothuroidea 2
Ascidiacea. Enterogona 1, 12, Pleurogona 7, 14.

REMARKS: This station outside the Heads is off Barwon Heads.

AREA 57 (294)

Depth. 10 fm
Substrate. Sand and reef
Algae. Rhodophyta 100
Annelida. Polychaeta 16
Bryozoa. 13, 27, 45, 54, 68, 81, 83-84, 92, 96, 107
Echinodermata. Ophiuroidea 10
Ascidiacea. Pleurogona 19.

AREA 58 (80)

Depth. 2·5 fm
Substrate. Sand and reef
Coelenterata. Hydrozoa 4, 6, 14, Actinaria 10, 12
Annelida. Polychaeta 51
Crustacea. Isopoda 14, 20, 26, Brachyura 7, 21
Mollusca. Gastropoda 29, 37
Bryozoa. 23, 84.

AREA 58 (81)

Depth. 2 fm
Substrate. Sand
Phanerogam. 3?
Crustacea. Brachyura 7
Mollusca. Gastropoda 1, 13, 37
Bryozoa. 101
Echinodermata. Asteroidea 10A.

AREA 58 (88)

Depth. 7 fm
Substrate. Sand
Coelenterata. Hydrozoa 15-16, 19
Crustacea. Brachyura 7, 10, 20
Mollusca. Gastropoda 22-23, 25, 58, 65, 86, 88-89, 96, 101, Opisthobranchia 11, Bivalvia 8, 37
Bryozoa. 1, 12, 19, 32, 50, 56, 61, 63, 65, 67, 70, 89, 96, 102, 110, 112.

AREA 58 (89)

Depth. Intertidal collecting
Substrate. Sand
Phanerogam. 1
Crustacea. Brachyura 5, 15, 19, 30
Mollusca. Gastropoda 51, 57, 92-93, 95, Bivalvia 6, 24, 35-36
Bryozoa. 47, 80.

AREA 58 (90)

Depth. 6 fm
Substrate. Sand
Phanerogam. 1
Coelenterata. Actinaria 8, Scleractinia 1.

AREA 58 (91)

Depth. 6 fm
Substrate. Sand
Phanerogam. 1
Annelida. Polychaeta 23, 57.

AREA 58 (150-4)

Depth. 3-6·5 fm
Substrate. Sand and reef
Algae. Chlorophyta 2, 9-10, 12, 14, 18-19, Phaeophyta 41, 54-55, 58, 62, 69, Rhodophyta 76, 81, 84, 94, 104, 113-114, 119, 147, 160, 163
Crustacea. Isopoda 16, 21, Brachyura 2, 7, 12, 14
Mollusca. Gastropoda 1-2
Bryozoa. 8, 14-15, 20, 22, 34, 45, 55, 62, 66, 68, 79-80, 90, 98-99, 103-104, 109
Echinodermata. Crinoidea 4, Asteroidea 6, 10, Ophiuroidea 2, 4, 5, 10, Echinoidea 2, Holothuroidea 4
Ascidiacea. Enterogona 9.

REMARKS: These four stations in Lonsdale Bight show that this area is very uniform with a large algal and bryozoal population. The majority of species collected occurred at the four stations but in addition each station had a few species peculiar to it, and these are listed below.

AREA 58 (150)

Depth. 3 fm
Phanerogams. 1, 4
Algae. Phaeophyta 65
Crustacea. Isopoda 6, 11-12, 26
Mollusca. Gastropoda 3.

AREA 58 (151)

Depth. 3·5 fm
Phanerogams. 4
Algae. Phaeophyta 67
Crustacea. Isopoda 6, 11-12, 26
Mollusca. Gatsropoda 23, 40, 76, 89, 91, 98, 100
Echinodermata. Crinoidea 2, 6
Ascidiacea. Pleurogona 14, 19.

AREA 58 (152)

Depth. 3·5 fm
Phanerogams. 4
Crustacea. Isopoda 6, 11-12, 26
Mollusca. Gatsropoda 98.

AREA 58 (153)

Depth. 6·5 fm
Algae. Phaeophyta 65

AREA 58 (154)

Depth. 5 fm.

REMARKS: This flora and fauna was confined to the combined station list.

AREA 58 (223)

Depth. 2 fm
Substrate. Sand
Phanerogams. 4
Algae. Phaeophyta 51-52
Coelenterata. Hydrozoa 20, 28-29, 30
Bryozoa. 38.

AREA 58 (290)

Depth. 7 fm
Substrate. Sand
Phanerogam. 1
Coelenterata. Scleractinia 4
Crustacea. Brachyura 12
Mollusca. Gatsropoda 6
Bryozoa. 8-9, 22, 38, 45-46, 53, 56, 80, 84-85, 88, 95-97, 102
Echinodermata. Crinoidea 5, Ophiruoidea 3
Ascidiacea. Enterogona 4.

REMARKS: This station is on the dune limestone platform on the ocean side of Point Nepean.

AREA 58 (293)

Depth. 6 fm
Substrate. Sand with dune limestone reef
Algae. Chlorophyta 11, Phaeophyta 47, 56, Rhodophyta 78, 93, 130, 166
Coelentrata. Actinaria 15, Octocorallia 4-5
Crustacea. Brachyura 1
Mollusca. Amphineura 1, 10
Bryozoa. 35, 73, 108
Echinodermata. Echinoidea 3A
Ascidiacea. Pleurogona 19.

AREA 59 (23)

Depth. 2·5 fm
Substrate. Sand and dune limestone reef
Algae. Chlorophyta 1, 8, 15, Phateophyta 46, 57A, 62, 65-66, 73, Rhodophyta 82, 138, 140, 168-169
Porifera. Red sponge
Coelenterata. Actinaria 6
Annelida. Polychaeta 20, 26
Crustacea. Isopoda 11, 23, 26, Brachyura 3
Mollusca. Gastropoda 3, 7, 14, 25, 29, 31, 36-39, 49, 62 on 98, 76, 82, 93, 98, 104, 108, Bivalvia 5, 9, 37
Bryozoa. 24, 33, 42-43, 84
Ascidiacea. Enterogona 1-2, 16, Pleurogona 5.

AREA 59 (24)

Depth. 1·5 fm
Substrate. Sand and piles of pier
Porifera. Abundant sponges
Coelenterata. Hydrozoa 5, 17, Actinaria 12
Annelida. Polychaeta 31, 33, 44, 47, 51, 60, Sipunculoidea 1
Mollusca. Gastropoda 1, 3, 82, 108, Bivalvia 12
Bryozoa. 10, 26, 47, 51, 60, 84, 86, 91-92, 95
Echinodermata. Crinoidea 5, Asteroidea 1, 5-6, 10A, 15-16, Ophiuroidea 1, 5, 10, 12-14, Echinoidea 2
Ascidiacea. Enterogona 1, 2, 16, Pleurogona 5, 9, 14, 15, 19.

REMARKS: This station was at Portsea Pier, the piles, and the surrounding sand.

AREA 59 (25)

Depth. 2·5 fm
Substrate. Sand
Phanerogam. 1
Coelenterata. Actinaria 7, 12
Crustacea. Isopoda 26, Brachyura 7
Mollusca. Gastropoda 22, 32, 34, 38, 62, 89, 98, Bivalvia 11A
Echinodermata. Asteroidea 1, Holothuroidea 6.

AREA 59 (36)

Depth. 2-6 fm
Substrate. Sand and artificial reef
Algae. Chlorophyta 10, 15, 17, 19-21, Phaeophyta 28-29, 31, 41, 46-50, 56, 57A, 61, 73, Rhodophyta 78-79, 82, 87, 93-96, 101, 106, 127-128, 136, 138, 168
Coelenterata. Hydrozoa 1, 8, 10, 23-24, 26, 30-32, Actinaria 13, Octocorallia 1, 5-9, Scleractinia 34
Annelida. Polychaeta 17, 20, 23, 25-26, 31, 44, 48, 51
Crustacea. Isopoda 6, 16, 26, Brachyura 4, 7, 10, 17, 19-21

Mollusca. Amphineura 10, 20, Gastropoda 1, 3-5, 10, 13, 21-22, 34, 37, 59, 60, 67, 71-72, 74, 76, 82, 89, 96-97, 101, 105-107, 110, Opisthobranchia 13, Bivalvia 10, 15, 20, 37, 41
Bryozoa. 1, 4, 8, 11-12, 14, 16-17, 19, 21-23, 26, 28-29, 30, 33, 36-40, 44-45, 52-54, 56-59, 63, 67, 76, 80, 83-85, 91, 95-96, 98-100, 102, 104-106, 111-113
Echinodermata. Crinoidea 1, 4-5, Asteroidea 3, 14-15, Ophiuroidea 1-2, 4-5, 10, Echinoidea 1, 4
Ascidiacea. Enterogona 5-6, 9, Pleurogona 5, 14-15, 19.

REMARKS: This station is the artificial reef of the Popes Eye Annulus and its surround.

AREA 59 (79)

Depth. 2 fm
Substrate. Sand
Algae. Chlorophyta 8, 15, 20-21, Phaeophyta 42, 44, 46, 51, 57A, 59, 65, 69, 71, Rhodophyta 82, 85, 94, 96, 107-108, 112, 140, 149, 159, 169
Coelenterata. Hydrozoa 8, 17, 24, Actinaria 2
Annelida. Polychaeta 23
Crustacea. Isopoda 10, Brachyura 12
Mollusca. Gastropoda 1, 77, 82, Bivalvia 9
Bryozoa. 12, 98
Echinodermata. Asteroidea 1, Ophiuroidea 10
Ascidiacea. Enterogona 15.

REMARKS: This station is the Quarantine Jetty, Point Nepean.

AREA 59 (87)

Depth. 7·5 fm
Substrate. Sand
Algae. Phaeophyta 42, 68, Rhodophyta 99, 102, 117, 125, 128, 161
Coelenterata. Hydrozoa 9, 11, 17-18
Annelida. Polychaeta 51
Crustacea. Isopoda 12, Brachyura 12
Bryozoa. 7, 56, 81, 101, 108
Echinodermata. Ophiuroidea 10.

AREA 59 (213)

Depth. 8 fm
Substrate. Dune limestone with only 2·5 cm of sand and a large area of bare rock
Algae. Phaeophyta 57A
Porifera. Abundant sponges
Annelida. Polychaeta 47
Mollusca. Gastropoda 32, 38, 71, 82, Opisthobranchia *Rostangia arbuta* in sponge, Bivalvia 9, 11A-12
Echinodermata. Holothuroidea 9
Ascidiacea. Pleurogona 15?

REMARKS: The large number of sponges were the habitat for numerous amphipods and isopods.

AREA 59 (214)

Depth. 6 fm
Substrate. Sand
Phanerogams. 1, 4
Algae. Chlorophyta 8? Rhodophyta 75, 108, 116, 159
Annelida. 1
Crustacea. Isopoda 15, 17, Brachyura 11, 25
Mollusca. Bivalvia 10, Cephalopoda 2
Echinodermata. Ophiuroidea 5, 10, Holothuroidea 2.

AREA 59 (224)

Depth. 9 fm
Substrate. Sand
Algae. Phaeophyta 73, Rhodophyta 94, 158, 159, 161
Crustacea. Brachyura 7, 11, 16
Mollusca. Bivalvia 10.

REMARKS: A comparatively barren station.

AREA 59 (225)

Depth. 8·75 fm
Substrate. Sand with pebbles
Algae. Chlorophyta 8, 19, Phaeophyta 57A
Bryozoa. 3, 64, 99.

AREA 59 (226)

Depth. 8 fm
Substrate. Sand
Phanerogam. 1
Algae. Chlorophyta 19, Phaeophyta 42, 48, 57A, 60, 73, Rhodophyta 80, 88, 94, 102, 137, 142, 158
Mollusca. Bivalvia 10.

AREA 59 (227)

Depth. 8 fm
Substrate. Coarse sand
Crustacea. Brachyura 14.

REMARKS: The ripple-marked and scoured sand was barren except for the crab.

AREA 59 (234)

Depth. 8 fm
Substrate. Sand
Phanerogam. 1
Algae. Chlorophyta 8, 16, Phaeophyta 28, 31, Rhodophyta 85, 126, 145-146
Echinodermata. Ophiuroidea 10.

AREA 60 (85)

Depth. 6 fm
Substrate. Sand
Algae. Chlorophyta 1, 19, Phaeophyta 61, Rhodophyta 91, 94, 129, 146, 155, 158, 162
Crustacea. Brachyura 17
Mollusca. Bivalvia 11A.

AREA 60 (86)

Depth. 11 fm
Substrate. Completely barren scouring sand.

AREA 60 (215)

Depth. 6 fm
Substrate. Almost barren sand with rock fragments
Bryozoa. 5

AREA 60 (235)

Depth. 8 fm
Substrate. Sand
Phanerogam. 1
Algae. Rhodophyta 91, 120
Crustacea. Brachyura 7, 11
Mollusca. Bivalvia 9 (dead)
Ascidiacea. Pleurogona 6, 21.

AREA 60 (268)

Depth. 1·5 fm
Substrate. Sand with shell
Phanerogam. 1
Algae. Phaeophyta 25-27
Coelenterata. Hydrozoa 3
Mollusca. Bivalvia 10
Bryozoa. 17.

REMARKS: On sandbank W. of Mud Island.

AREA 60 (269)

Depth. 1·5 fm
Substrate. Fine shell sand
Algae. Rhodophyta 140.

AREA 61 (37)

Depth. 4 fm
Substrate. Sand and artificial rock platform
Algae. Chlorophyta 22, Phaeophyta 51, 64, Rhodophyta 82, 169
Porifera. Various sponges
Coelenterata. Hydrozoa 4, 6, Actinaria 12, Octocorallia 5-6
Annelida. Polychaeta 7, 34
Crustacea. Isopoda 6, 21, 23-24, 26, Brachyura 19, 21
Mollusca. Gastropoda 1, 12, 62 on 1, 65, 67-68, 95, 97-98, 110, Opisthobranchia 4, 10, Bivalvia 3, 9-10, 13, 23
Echinodermata. Crinoidea 1, 6, Asteroidea 1, 14, Ophiuroidea 4-5, Echinoidea 3, Holothuroidea 2-4
Ascidiacea. Enterogona 7, 10, 19.

AREA 61 (239)

Depth. 4 fm
Substrate. Sand
Phanerogam. 1
Annelida. Polychaeta 1, 44
Crustacea. Brachyura 7, 13, 21
Mollusca. Amphineura 11, Gastropoda 1, Bivalvia 9
Bryozoa. 47, 65, 94
Echinodermata. Ophiuroidea 10
Ascidiacea. Pleurogona 19.

REMARKS: This station like (37) is located on S. Channel Fort.

AREA 61 (240)

Depth. 2 fm
Substrate. A bare sand floor
Mollusca. Gastropoda 96, Bivalvia 1, 19.

AREA 61 (241)

Depth. 7·5 fm
Substrate. Silty sand
Annelida. Polychaeta 36, 53?
Crustacea. Isopoda 17, Brachyura 8
Mollusca. Bivalvia 43
Bryozoa. 7
Echinodermata. Crinoidea 3, Ophiuroidea 7, Holothuroidea 9.

AREA 61 (242)

Depth. 11 fm
Substrate. Silty sand
Algae. Chlorophyta 12
Annelida. Polychaeta 21, 37, 45
Crustacea. Isopoda 17, Brachyura 7, 13
Mollusca. Bivalvia 9, 11A, 13
Bryozoa. 5, 19
Ascidiacea. Enterogona 17?, Pleurogona 15.

AREA 62 (96)

Depth. 6 fm
Substrate. Sand
Crustacea. Isopoda 12, Brachyura 7-8, 21-22
Mollusca. Gastropoda 15, 36, 80, 96, 106, Bivalvia 9, 11A, 13
Bryozoa. 93
Echinodermata. Ophiuroidea 5-6, 15.

AREA 62 (98)

Depth. 6 fm
Substrate. Sand
Mollusca. Bivalvia 11A.

AREA 62 (99)

Depth. 6 fm
Substrate. Coarse sand and shell
Porifera. Branching sponge
Coelenterata. Hydrozoa 22
Mollusca. Gastropoda 15, Bivalvia 11A
Echinodermata. Asteroidea 1
Ascidiacea. Pleurogona 18.

AREA 62 (243)

Depth. 11 fm
Substrate. Silty sand
Algae. Phaeophyta 51?
Annelida. Polychaeta 53?
Crustacea. Brachyura 7, 13
Mollusca. Bivalvia 9, 11A, 13, 21
Ascidiacea. Enterogona 17, Pleurogona 15,

AREA 62 (244)

Depth. 9·5 fm
Substrate. Silty sand grading to clay
Annelida. Polychaeta 36, 53
Crustacea. Brachyura 8, 13
Mollusca. Gastropoda 80
Echinodermata. Ophiuroidea 7, Echinoidea 4, Holothuroidea 8-9.

AREA 63 (16)

Depth. 4 fm
Substrate. Sand
Algae. Rhodophyta 139
Coelenterata. Hydrozoa 6
Annelida. Polychaeta 1
Crustacea. Isopoda 1
Mollusca. Gastropoda 80, 96, Bivalvia 9
Ascidiacea. Pleurogona 15.

AREA 63 (17)

Depth. 3·5 fm
Substrate. Sand
Chlorophyta. 1
Algae. Phacophyta 31, Rhodophyta 139, 155, 159
Crustacea. Cirripedia 1
Mollusca. Gastropoda 80, 96, Bivalvia 9
Ascidiacea. Pleurogona 15, 17.

AREA 63 (18)

Depth. 3 fm
Substrate. Sand
Algae. Chlorophyta 8, Phaeophyta 31, Rhodophyta 139, 155, 159
Annelida. Polychaeta 56?
Crustacea. Isopoda 11-12
Mollusca. Gastropoda 80, 96, Bivalvia 9
Echinodermata. Holothuroidea 1.

AREA 63 (19)

Depth. 2·5 fm
Substrate. Sand
Algae. Phaeophyta 31, Rhodophyta 139, 155, 159
Annelida. Polychaeta 1, 15
Mollusca. Gastropoda 80, 96, Bivalvia 9, 13
Ascidiacea. Pleurogona 18?

AREA 63 (20)

Depth. 2·5 fm
Substrate. Sand
Algae. Phaeophyta 63, Rhodophyta 139
Annelida. Polychaeta 1, 20
Crustacea. Brachyura 13, 22
Mollusca. Gastropoda 80, 96.

AREA 63 (21)

Depth. 2·5 fm
Substrate. Sand
Algae. Phaeophyta 31, 73, Rhodophyta 139, 155, 159
Annelida. Polychaeta 1, 44
Crustacea. Brachyura 8, 16
Mollusca. Bivalvia 9, 13
Ascidiacea. Pleurogona 17?

REMARKS: Stations 17-21 on the N. shore of Safety Bay are a series of close inshore stations, together giving a picture of the community inhabiting the locality.

AREA 63 (159)

Depth. 10 fm
Substrate. Clay
Annelida. Polychaeta 53?
Crustacea. Brachyura 13, 26 in *Mytilus planulatus*
Mollusca. Bivalvia 9, 11A, 13
Echinodermata. Asteroidea 2, Echinoidea 4, Holothuroidea 2
Ascidiacea. Pleurogona 10, 17 attached to *Pecten alba*

REMARKS: This station is on the edge of the clay and has a mingling of the silty sand and clay faunas.

AREA 63 (160)

Depth. 5 fm
Substrate. Sand-clay-silt
Crustacea. Brachyura 13?, 26 on *Mytilus planulatus*
Mollusca. Bivalvia 9, 13
Echinodermata. Asteroidea 14
Ascidiacea. Pleurogona 15, 17.

AREA 63 (161)

Depth. 4 fm
Substrate. Coarse sand
Annelida. Polychaeta 1
Crustacea. Brachyura 26
Mollusca. Bivalvia 9, 13
Echinodermata. Asteroidea 14
Ascidiacea. Pleurogona 15, 17.

AREA 63 (162)

Depth. 2 fm
Substrate. Sand
Annelida. Polychaeta 1
Crustacea. Brachyura 8, 26
Mollusca. Bivalvia 9, 13
Ascidiacea. Pleurogona 15, 17.

AREA 63 (245)

Depth. 9 fm
Substrate. Silty sand
Annelida. Polychaeta 21
Crustacea. Brachyura 13, 25
Mollusca. Bivalvia 11A, 13
Ascidiacea. Enterogona 17, Pleurogona 13, 15.

REMARKS: A scallop ground.

AREA 63 (246)

Depth. 8·5 fm
Substrate. Sand
Substrate. Silty sand grading to clay
Annelida. Polychaeta 36, 53?
Mollusca. Bivalvia 11A, 13, 15
Echinodermata. Ophiuroidea 7, Echinoidea 4, Holothuroidea 8-9
Ascidiacea. Pleurogona 15.

AREA 63 (247)

Depth. 7 fm
Substrate. Fine sand
Mollusca. Bivalvia 11A, 13
Ascidiacea. Pleurogona 15.

AREA 63 (248)

Depth. 4·5 fm
Substrate. Coarse sand
Annelida. Echiuroidea 3?
Mollusca. Bivalvia 11A
Ascidiacea. Pleurogona 15.

AREA 63 (249)

Depth. 4·5 fm
Substrate. Sand
Algae. Rhodophyta 122, 156
Porifera. Several sponges
Annelida. Echiuroidea 3?
Mollusca. Bivalvia 11A
Ascidiacea. Pleurogona 17.

AREA 64 (163)

Depth. 2 fm
Substrate. Reef and sand
Algae. Phaeophyta
Annelida. Polychaeta 44, 53
Crustacea. Brachyura 7
Mollusca. Amphineura 12, Gastropoda 1, 19, 34, 77, 80, 93, Bivalvia 1, 3, 9, 13, 24, 31-32
Echinodermata. Asteroidea 16
Ascidiacea. Enterogona 17, Pleurogona 15, 17.

REMARKS: This station and the following 164 are on the granite reefs at the base of Martha Cliff.

AREA 64 (164)

Depth. 1·5 fm
Substrate. Reef and sand
Algae. Phaeophyta 51?, 61
Porifera. Sponges abundant
Coelenterata. Scleractinia 1?
Annelida. Polychaeta 25
Crustacea. Brachyura 22

Mollusca. Gastropoda 2, 8-9, 37, 65, 77-78, 98, Opisthobranchia 4, Bivalvia 3, 9, 12-13, 20, 31, 41, Cephalopoda 9, 11
Echinodermeta. Asteroidea 1, 14, Ophiurodiea 5, Echinoidea 2, Holothuroidea 1, 6.

AREA 66 (291)

Depth. 10 fm
Substrate. Sand
Phanerogams. 1, 4
Algae. Chlorophyta 10, Phaeophyta 57, Rhodophyta 76, 79, 81-82, 94, 98, 100, 108, 123, 128, 130, 146A, 165
Crustacea. Isopoda 4, 6, 18
Bryozoa. 8-9, 31, 45, 53, 56, 70-71, 96
Ascidiacea. Enterogona 9, Pleurogona 19.

AREA 66 (292)

Depth. 10 fm
Substrate. Sand and dune limestone reef
Algae. Phaeophyta 51
Coelenterata. Hydrozoa 28, 31
Annelida. Polychaeta 8, 23, 50, 55
Crustacea. Isopoda 6, 18, Brachyura 19-20
Mollusca. Amphineura 10, 20, Gastropoda 6, 24, 73, 103
Bryozoa. 9, 53, 56, 70-71, 75, 96
Echinodermata. Asteroidea 3-4, 8, 12-13, Ophiuroidea 10
Ascidiacea. Enterogona 9, Pleurogona 19.

REMARKS: The reefs on this open coast have abundant sponges which harbour several species, including the small brittle star.

AREA 67 (216)

Depth. 4 fm
Substrate. Sand
Phanerogam. 1?
Algae. Chlorophyta 16?
Porifera. A few sponges
Annelida. Polychaeta 1, 35
Crustacea. Brachyura 7, 11, 25
Mollusca. Bivalvia 9-10, 13, 23
Echinodermata. Ophiuroidea 5
Ascidiacea. Enterogona 7, 17, Pleurogona 6, 15, 19.

AREA 67 (217)

Depth. 3·5 fm
Substrate. Fine sand with shell
Phanerogam. 1?
Annelida. Polychacta 15, 25, 47, 51, 53
Crustacea. Brachyura 7
Mollusca. Bivalvia 11A
Ascidiacea. Pleurogona 17.

AREA 68 (155)

Depth. 5·5 fm
Substrate. Sand
Phanerogam. 1
Porifera. Two red branching sponges
Annelida. Polychacta 20
Crustacea. Isopoda 12, Brachyura 4, 7-8, 21, 25
Mollusca. Gastropoda 25, 32, 34, 56, 88, Bivalvia 13, 26
Echinodermata. Asteroidea 1, Holothuroidea 1.

AREA 68 (156)

Depth. 7·5 fm
Substrate. Sand
Porifera. Several sponges
Annelida. Polychaeta 44?
Mollusca. Bivalvia 10, 11A, Cephalopoda 3
Echinodermata. Asteroidea 1
Ascidiacea. Pleurogona 13?

AREA 68 (157)

Depth. 6 fm
Substrate. Sand
Porifera. Some sponges
Crustacea. Brachyura 4
Mollusca. Gastropoda 98, 104, Bivalvia 9-10 Asteroidea 1
Echinodermata. Holothuroidea 1.

AREA 68 (158)

Depth. 8 fm
Substrate. Fine sand
Annelida. Polychaeta 53
Crustacea. Isopoda 11-12, 17, Brachyura 13
Mollusca. Gastropoda 96, Bivalvia 13, 15.

AREA 68 (218)

Depth. 5 fm
Substrate. Sand with shell
Algae. Rhodophyta 122
Porifera. Some sponges
Coelenterata. Hydrozoa 6, 28
Echinodermata. Asteroidea 1.

AREA 68 (219)

Depth. 6·75 fm
Substrate. Fine sand
Porifera. Some sponges

Coelenterata. Hydrozoa 6, 28
Mollusca. Gastropoda 98, Bivalvia 11A
Echinodermata. Echinoidea 4?, Holothuroidea 1?

AREA 68 (220)

Depth. 7·5 fm
Substrate. Fine sand with many dead shells
Crustacea. Brachyura 3, 13-14
Echinodermata. Ophiuroidea 9, Echinoidea 4, Holothuroidea 1.

AREA 69 (97)

Depth. 6.5 fm
Substrate. Sand
Annelida. Polychaeta 1, 14
Mollusca. Gastropoda 15, Bivalvia 11A, 13, 21.

AREA 69 (100)

Depth. 3 fm
Substrate. Sand
Porifera. Brown sponges abundant
Crustacea. Brachyura 14, 22
Mollusca. Bivalvia 11A
Ascidiacea. Pleurogona 15?, 17.

AREA 69 (221)

Depth. 4 fm
Substrate. Sand
Coelenterata. Hydrozoa 31, 31A, Octocorallia 1
Annelida. Polychaeta 30
Crustacea. Isopoda 17, Brachyura 7, 14, 21, 25
Mollusca. Gastropoda 63 on *Fulvia*, Bivalvia 11A, 15
Bryozoa. 65, 87
Echinodermata. Asteroidea 2, Echinoidea 2
Ascidiacea. Enterogona 3.

AREA 69 (222)

Depth. 5 fm
Substrate. Sand
Porifera. Some sponges
Coelenterata. Hydrozoa 3, 31, 31A
Annelida. Polychaeta 5, 9, 24, 26
Crustacea. Isopoda 17, Brachyura 21-22
Mollusca. Bivalvia 10, 11A, 15
Echinodermata. Asteroidea 2
Ascidiacea. Pleurogona 15.

Discussion

Biological Communities

Port Phillip is a broad shallow bay with a narrow opening to the ocean on the S. extremity. This opening, between the low dune limestone cliffs of Point Lonsdale and Point Nepean, is only 2 miles (3·2 km) wide with a dredged depth on the limestone bar of 50 ft (15 m). Each side of the bar the depth increases rapidly, and a scour hole has a depth of approximately 280 feet (Keble 1946). Spot diving and dredging in the entrance channel indicates that the bottom is barren sand, probably due to the scour by the strong currents and daily rip tides. This in contrast with the rich flora and fauna of the underwater limestone platforms that run out from the bases of the two points for about 0·5 mile (0·8 km) both within and outside the heads at depths of 2-3 fm.

Port Phillip is a drowned river system (Keble 1946, Bowler 1966) and the contours of the former valley are reproduced in the bathymetric contours, but the overall impression is of an irregular saucer with gently sloping sides and a flat central area of 13 fm. The slopes are more gentle towards the N. so that the deepest area is slightly S. of the central E-W. line, and there is a long shallow W. extension to form Corio Bay.

The biological communities fall into two parts governed by substrate. The major portion of the bay has sediments ranging from gravels to clays and comprising approximately 90 per cent of the area. The other 10 per cent consists of reefs, usually in shallow water, of a variety of rock types. These reefs are the seaward extensions of the rock forming the adjacent shoreline.

The fauna associated with these two substrate types can be divided into two sections (Petersen 1913): 1. The infauna comprising all animals living on and in the sedimentary sea floor, and 2. The epifauna animals living upon a firm surface of rock, shell or vegetation. A third group (not considered to any extent) is the pelagic animals which are of course intimately related and often dependent upon the benthic community.

The limited facilities both of manpower and equipment made it impossible to make quantitative collections, and the abundance of species has been based on the reports of the divers and the processing of the collected material. The author is fully aware of the limitations of this method, but hopes that observations and deductions are accurate enough to give a picture of the ecological communities present and their approximate limits, so as to form a foundation for further detailed work.

As the sediments comprise the greater proportion of the bay, it is proposed to deal with them first. The communities are governed by depth, substrate and degree of shelter, or perhaps more correctly the degree of flushing afforded by the daily tidal movement. Thus they appear to zone the sides of the saucer in a series of parallel bands almost comparable with the intertidal zones of a rock platform.

The central basin situated within the 10 fm line has a substrate of fine sediments which are silty clays in the N. half and in Corio Bay, while the S. sector has a clay substrate. The community is an echinoderm-annelid one, the dominant echinoderms being *Echinocardum cordatum, Amphiura elandiformis, Trochodota allani* and *Leptosynapta dolabrifera.* In the N. silty clays the dominant annelid is *Chaetopterus variopedatus*, but in the S. clays *Myxicola infundibulum, Ostraea angasi* and *Pecten alba* also occur spasmodically, the latter a migrant from the silty sand and sand. The silty sand substrate forms a narrow band surrounding these clay sediments except in the SW. where there is a sharp division between the clay and sand at the 10 fm line.

The silty sand band is wide in the NW. sector and it also extends into Corio Bay. The dominant animals are *Amphrites rubra, Pecten alba, Stichopus mollis* and *Pyura praeputialis,* with the following species often present—*Ostraea angasi, Tosia magnifica* and *Pentacta australis.* In the NW. there are extensive *Mytilus planulatus* beds, and associated with them an orange branching sponge and the bryozoan *Amalthia tortuosa.*

From the shore to approximately 6 fm the substrate is sand of varying grain size, except for Swan Bay, and the W. and N. shores of Corio Bay where the clays and silty clays extend to the shoreline. The fauna of this substrate is not uniform, but different communities occur with the changing grain size and position in relation to the Heads, which area is comparatively barren. The sand of Areas 24 and 36 has a sparse fauna consisting mostly of the bivalves *Mytilus planulatus, Ostrea angasi, Chioneryx candioides* and *Phacosoma coerulea,* the ascidian *Pyura praeputialis*, the crab *Notomithrax minor*, as well a large *Bonellia* sp. which it was impossible to collect complete. It was found in large numbers at some stations, and although the divers made repeated efforts to collect whole specimens, they never succeeded in obtaining more than the long cream and chocolate proboscis.

On the NW. shore, including Areas 5, 9-10 and portions of 6, 7, 11, 16-19 inclusive, and on portions of 28-29, 40 on the S. shore of Corio Bay, as well as Areas 48, 55 between Frankston and Mornington, there are extensive beds of the green alga *Caulerpa brownii* and *C. remotifolia.* The dominant species of the epifauna associated with the *Caulerpa* is the bivalve *Electroma georgiana,* but it is also found in association with *Zostera* and other algae which afford it a suitable attachment. The fauna of the *Caulerpa* beds is large and varied as can be seen from the station lists.

Zostera beds occur on sand in Capell Sound and on the E. shores of the Bellarine Peninsula as well as on the silty and clayey sands of Swan Bay and Corio Bay. These beds are often fringed on their seaward side by *Cymodocea antarctica* and *Halophila ovalis*, which line the deeper channels. The *Zostera* provides shelter and a stable substrate for a large number of animals that are not adapted to the greater movement of the pure sand. Associated with the *Zostera* are a number of animals including *Amphitrites rubra, Carcinus maenus* and *Katelysia rhytiphora.*

The very well sheltered Swan Bay has a fauna typical of such conditions, of which the Tellinid bivalve *Homalina* is indicative. In the bay the mollusc is the closely allied species *Macoma deltoidalis*, and the associated fauna includes the annelids *Hormothoe spinosa,*

Curiformia tentaculata, Chaetopterus variopedalis and *Amphitrites rubra,* as well as the crabs *Philyra laevis* and *Litochiera bispinosa.*

The substrates which occur in Corio Bay indicate faunas similar to those within 7-13 fm in the main bay. However, the shallower water (5 fm maximum) produces a larger and more varied population. In the deep water with a clay substrate *Echinocardium cordatum* and *Leptosynapta dolabrifera* occur, but the ophiuroid is *Amphiura constricta.* On the N. shore, which has substrates of clayey sand (Area 26) and silty sand (Area 27), the bivalve *Anadara trapezia* occurs from the sub-littoral to 5 fm. Associated with it is a comparatively rich fauna —Areas 26 (126), 27 (41).

Reefs are formed by outcrops of the main rock types occurring round the bay, and are as follows:

1. The dune limestone of the Heads region. These platforms are very rich in both species and numbers of specimens of flora and fauna. Being S. of the Nepean Bay bar, they have the benefit of the daily flushing by the tide. Bracebridge Wilson collected this region and made extensive collections of all the major groups of algae and animals. This was repeated by the present survey as shown by stations Area 58 (150-4) and many of those of Area 59.

The Popes Eye Annulus Area 59 (36) is included here although it is a man-made structure of basalt blocks.

2. The Oligocene basalt (Gill 1961) of the NW. shore from Corio Bay to Williamstown dips under the bay floor and outcrops as comparatively soft reefs. These carry a typical rich reef population and an infauna of burrowing annelids and molluscs such as *Pholas australasiae.* At Area 25 (129) the basalt is overlain by a thin layer of clayey sand through which the *Pholas* projects its siphons to the surface.

Other stations on this type of reef are Area 6 (137), 13 (93-94), 27 (41, 139) and 28 (141).

3. Tertiary ironstone of the Miocene clays and sandstones of the N. and E. shores. On these ironstone reefs the star coral *Plesiastrea urvillei* occurs in some cases almost to the exclusion of other species. It is recorded as a dominant species at Area 3 (203), 5 (56), 14 (4-5), 55 (148), and 58 (90).

4. The granites of Martha Point extend seawards and form off-shore reefs—Areas 63 (163) and 64 (164).

The flora and fauna, though very large and varied, are typical of similar temperate regions, and can be paralleled by populations in both the N. and S. hemisphere. In spite of over a century of intensive habitation of its shores by man, the greater part of the bay had been little altered at the time of this survey. Hobson Bay has definitely suffered as shown by the molluscs and bryozoans recorded previously and on the present survey (Macpherson 1966, Vigeland 1971).

The greatest single change that the bay has suffered in recent years has been the intensive scallop fishing of the early 1960s. The extent of the alteration has not yet been fully assessed, but some spot dredging by the author has shown that the *Caulerpa* community has been spread to the W. of its previous limits. This is probably due to the dredges moving the skeletal material of the W. sands on to the silty sand and so providing a firm substrate.

References

GILL, E. D., 1961. Eustasy and the Yarra Delta. *Proc. R. Soc. Vict.* 74: 125-133.

KEBLE, R. A., 1944. The sunklands of Port Phillip and Bass Strait. *Mem. natn. Mus. Vict.* 14: 69-122.

KNOX, G. A., 1969. *The natural history of Canterbury.* Melbourne. 620 pp.

MORTON, J., and MILLER, M., 1968. *The New Zealand seashore.* Auckland. 638 pp.

PETERSEN, C. G. J., 1913. Valuation of the sea 2. *Rep. Danish biol. Stat.* 21: 1-44.

THORSON, G., 1957. Bottom communities. *Treatise on marine ecology and paleoecology* (Geo. Soc. Amer. Mem. 67) 1 Ecology, pp. 461-534.

All other references are to this *Memoir* or the previous one (No. 27) on this Survey.

10

TIDES AND TIDAL STREAMS

By Division of Ports and Harbors, Victoria

As the entrance to Port Phillip Bay is less than two nautical miles in width, and as the tidal area within the Heads is approximately 725 square miles, the tidal range in the bay is less than that at the entrance, and the times of high water at places within the bay lag behind that at the entrance.

Table 1 shows the average differences of the times of occurrence of high water at various places within Port Phillip from the time of occurrence of high water at Port Phillip Heads, and the average rises of the tide at springs and neaps.

The water level within the bay is much affected by meteorological conditions. Prolonged southerly and southwesterly winds cause a rise in the level of the bay, whilst easterly and northeasterly winds cause the water level to fall substantially.

The velocities of the stream are dependent upon the difference in water levels inside and outside the bay. Consequently, it will be seen that at high and low waters when the differences in levels are greatest, the velocities of the streams will be at their peaks. Again meteorological conditions will cause substantial changes in stream velocities.

Table 2 shows the average stream velocities and directions for various places in the bay.

Slack water occurs at the Heads when the water level inside the bay equals that outside in Kings Bight. This occurs at approximately half tide and the phenomena of a falling tide and an ingoing or flood stream and a rising tide and an outgoing or ebb stream occur. This is caused by the impeding effect of the constricted entrance and the delta formation of the sandbanks in the bay opposite the entrance.

The foregoing comments refer only to surface tidal streams, but direction and velocity measurements at varying depths are soon to be undertaken.

Table 1

Average differences of the times of occurrence of high water at various places within Port Phillip from the time of occurrence of high water at the Standard Port of Port Phillip Heads, and the average rises of the tide at springs and neaps.

	Time Difference	Average Rise of Tide (ft.)	
	H. M. later	Springs	Neaps
Port Phillip Heads	0 0	5·8	4·0
Point Nepean Jetty	0 09	3·5	2·5
Portsea Jetty	0 29	3·0	2·0
Sorrento Jetty	2 11	2·0	1·5
Dromana Jetty	2 33	3·0	2·0
Mornington Jetty	2 42	3·0	2·0
Frankston Jetty	3 07	3·0	2·0
Black Rock Breakwater	3 02	3·3	2·0
Williamstown (Breakwater Pier)	3 15	2·3	2·0
Portarlington Jetty	2 50	3·0	2·0

TABLE 1 (Continued)

	TIME DIFFERENCE H. M. later	AVERAGE RISE OF TIDE (FT.) Springs	Neaps
Indented Head	2 47	3·0	2·0
St. Leonards Jetty	2 44	3·0	2·0
Swan Island Dock	1 59	3·0	2·0
Queenscliff Jetty	0 03	4·0	3·0
West Channel (Northern End)	2 37	3·5	2·5
West Channel (Southern End)	0 15	4·0	3·0
South Channel (Eastern End)	3 18	3·0	2·0
South Channel (Western End)	0 15	4·0	3·0

TABLE 2

Average stream velocities and directions of the tide at various places within Port Phillip Bay.

	FLOOD	EBB
Port Phillip Heads	038° 2-3 knots	200° 2-3 knots
South Channel (Main stream)	108° 1·5 knots	260° 2 knots
South Channel (Eastern End)	045° 1·5 knots	180° 1·5 knots
Great Sand Channels	045°	225°
Quarantine Jetty	108° 0·8 knots	280° 0·8 knots
Portsea Jetty	Feeble	Feeble
West Channel (Main stream)	024° 1·5 knots	204° 1·5 knots
West Channel (Southern End)	055° 1·5 knots	250° 1·5 knots
West Channel (Northern End)	010° 1 knot	205° 1 knot
Coles Channel	015° 0·8 knots	195° 1 knot
Portarlington Jetty	Feeble	Feeble
Mornington Jetty	Feeble	Feeble
Williamstown	Feeble	Feeble

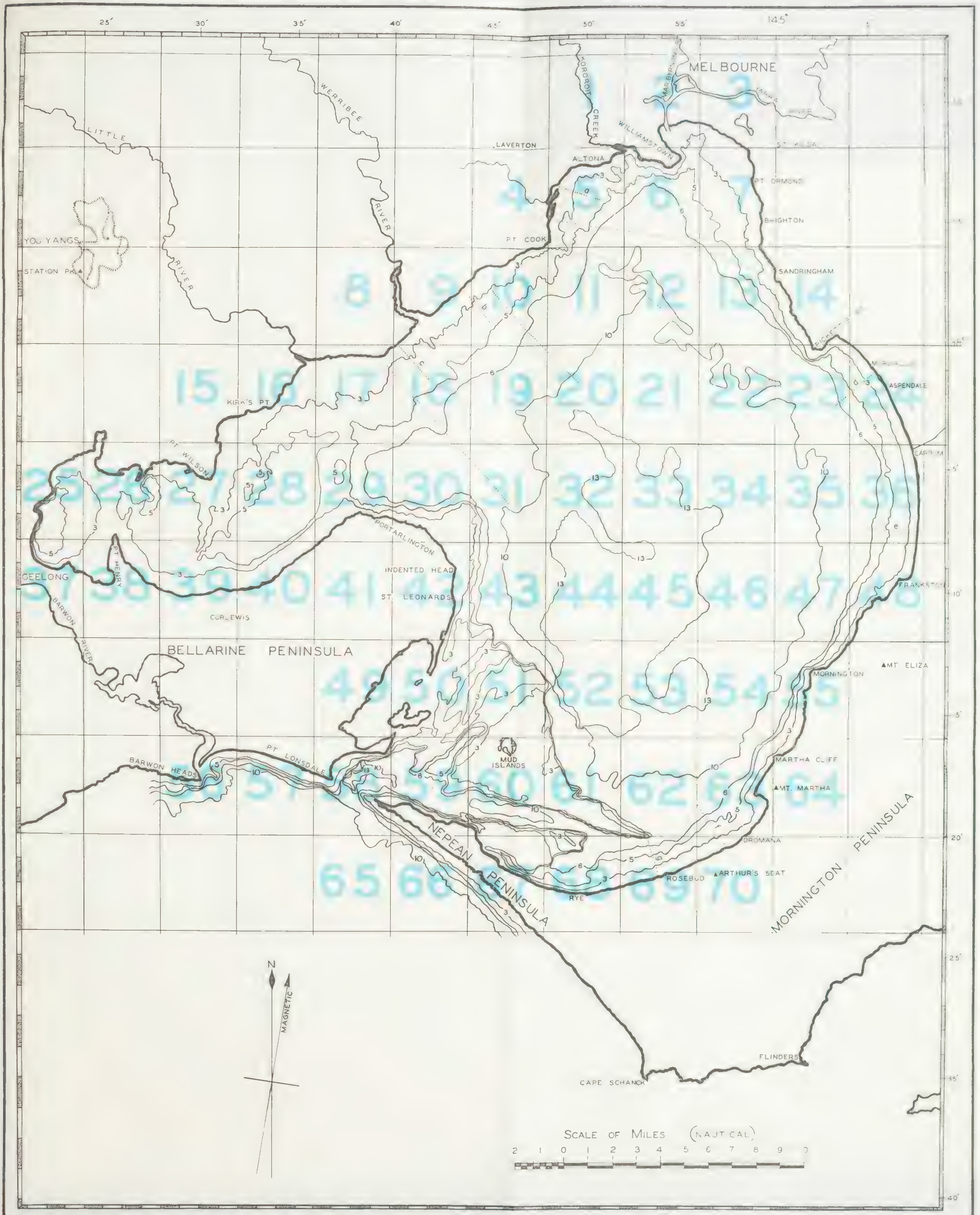

Chart 1.—Bathymetric Chart of Port Phillip Bay showing the 3, 5, 6, 10 and 13 fathom contour-lines.

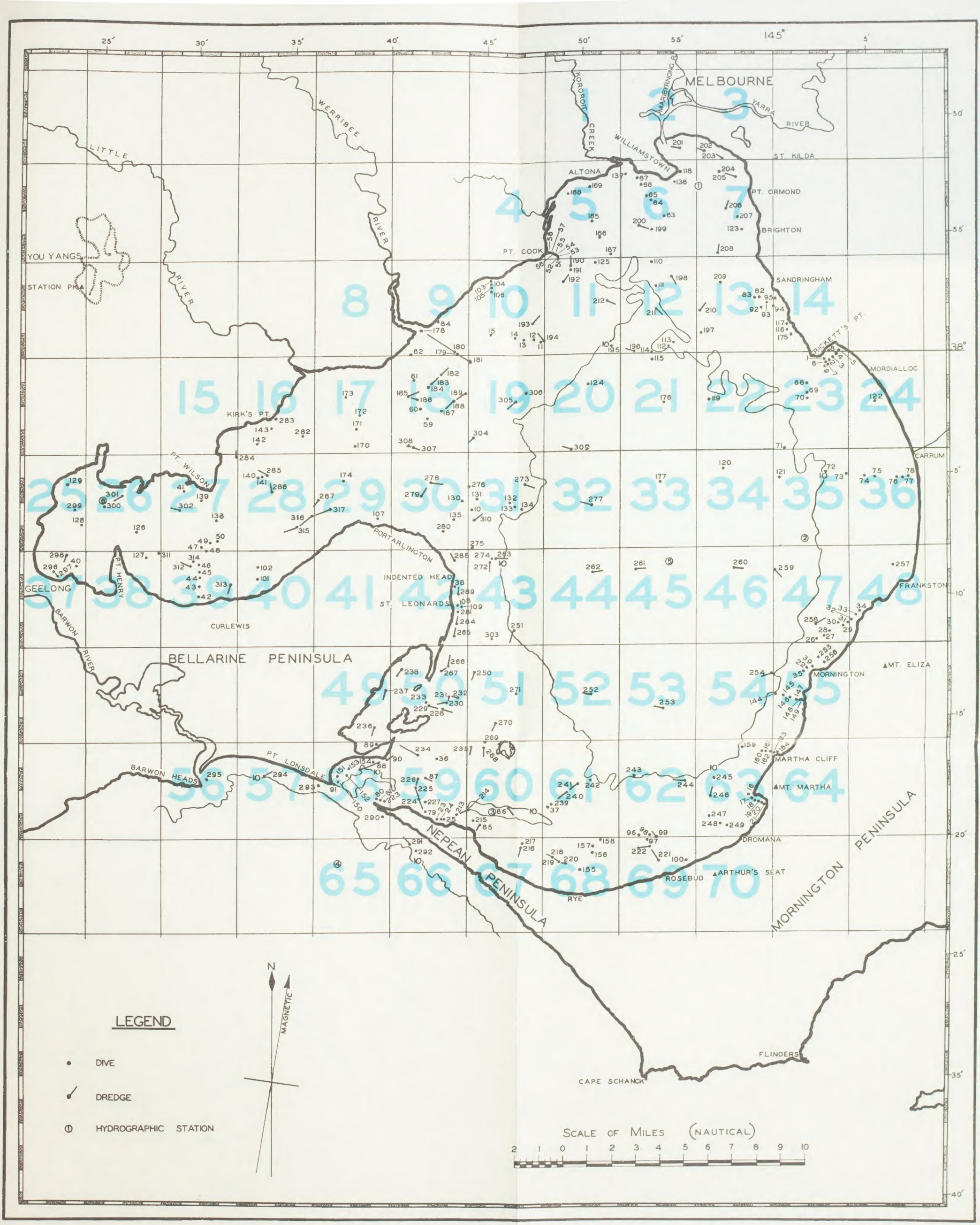

Chart 2.—Port Phillip showing sampling stations and positions of hydrographic stations.